

SAL28F28

(2.8/28) (28mm F2.8)

SERVICE MANUAL

Ver 1.1 2007.01

Revision History

How to use
Acrobat Reader



*US Model
Canadian Model
AEP Model
Chinese Model*

Link

• SPECIFICATIONS

• DISASSEMBLY

• ADJUSTMENTS

• SERVICE NOTE

• REPAIR PARTS LIST

LENS FOR DSLR CAMERA

SONY®



SPECIFICATIONS

- Depending on the lens mechanism, the focal length may change with any change of the shooting distance. The focal length assumes the lens is focused at infinity.

Equivalent 35mm-format focal length *¹ (mm)

42

*¹ The value for equivalent 35mm-format focal length is based on Digital Single Lens Reflex Cameras equipped with an APS-C sized image sensor.

Lens groups elements

5-5

Angle of view 1 *¹

75°

Angle of view 2 *¹

54°

*² The value of angle of view 1 is based on 35mm-format cameras, and that of angle of view 2 is based on Digital Single Lens Reflex Cameras equipped with an APS-C sized image sensor.

Minimum focus (m (feet)) *³

0.3 (1)

*³ Minimum focus is the shortest distance from the image sensor to the subject.

Maximum magnification (×)

0.13

Minimum f-stop

f/22

Filter diameter (mm)

49

Dimensions (maximum diameter × height) (mm (in.))

Approx. 65.5 × 42.5 (2 9/16 × 1 11/16)

Mass (g (oz.))

Approx. 185 (6 1/2)

Included items

Lens (1), Front lens cap (1), Rear lens cap (1), Set of printed documentation

Designs and specifications are subject to change without notice.

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1. SERVICE NOTE

1-1. Chemicals

Some chemicals used for servicing are highly volatile.

Their evaporation caused by improper management affects your health and environment, and wastes resources.

Manage the chemicals carefully as follows.

- Store chemicals sealed in a specific place to prevent from exposure to high temperature or direct sunlight.
- Avoid dividing chemicals into excessive numbers of small containers to reduce natural evaporation.
- Keep containers sealed to avoid natural evaporation when chemicals are not in use.
- Avoid using chemicals as much as possible. When using chemicals, divide only required amount to a small plate from the container and use up it.

1-2. Exterior Parts

Be careful to the following points for exterior parts used in this unit.

- Use a piece of cleaning paper or cleaning cloth for cleaning exterior parts. Avoid using chemicals.
Even if you have to use chemicals to clean heavy dirt, don't use paint thinner, ketone, nor alcohol.
- Insert the specific screws vertically to the part when installing a exterior part.
Be careful not to tighten screws too much.

1-3. Unleaded Solder

This unit uses unleaded solder.

Boards requiring use of unleaded solder are printed with the lead free mark (LF) indicating the solder contains no lead.

(**Caution:** Some printed circuit boards may not come printed with the lead free mark due to their particular size.)



: LEAD FREE MARK

Be careful to the following points to solder or unsolder.

- Set the soldering iron tip temperature to 350 °C approximately.
If cannot control temperature, solder/unsolder at high temperature for a short time.
Caution: The printed pattern (copper foil) may peel away if the heated tip is applied for too long, so be careful!
Unleaded solder is more viscous (sticky, less prone to flow) than ordinary solder so use caution not to let solder bridges occur such as on IC pins, etc.
- Be sure to control soldering iron tips used for unleaded solder and those for leaded solder so they are managed separately. Mixing unleaded solder and leaded solder will cause detachment phenomenon.

1-4. SAFETY CHECK-OUT



After correcting the original service problem, perform the following safety checks before releasing the set to the customer.

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are “pinched” or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, through functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the B+ voltage to see it is at the values specified.
6. Flexible Circuit Board Repairing
 - Keep the temperature of the soldering iron around 270 °C during repairing.
 - Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
 - Be careful not to apply force on the conductor when soldering or unsoldering.


CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type.

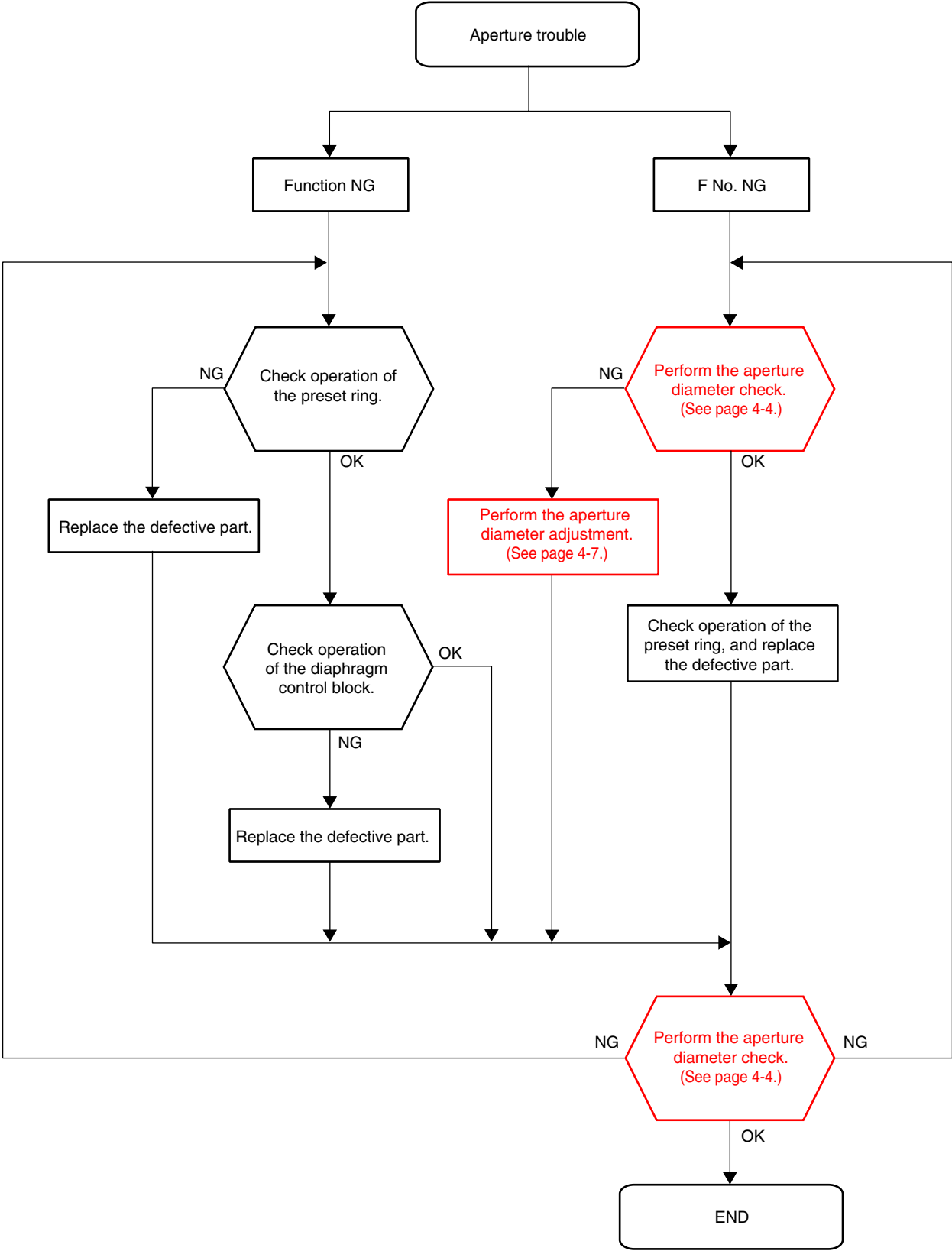
SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  OR DOTTED LINE WITH MARK  ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

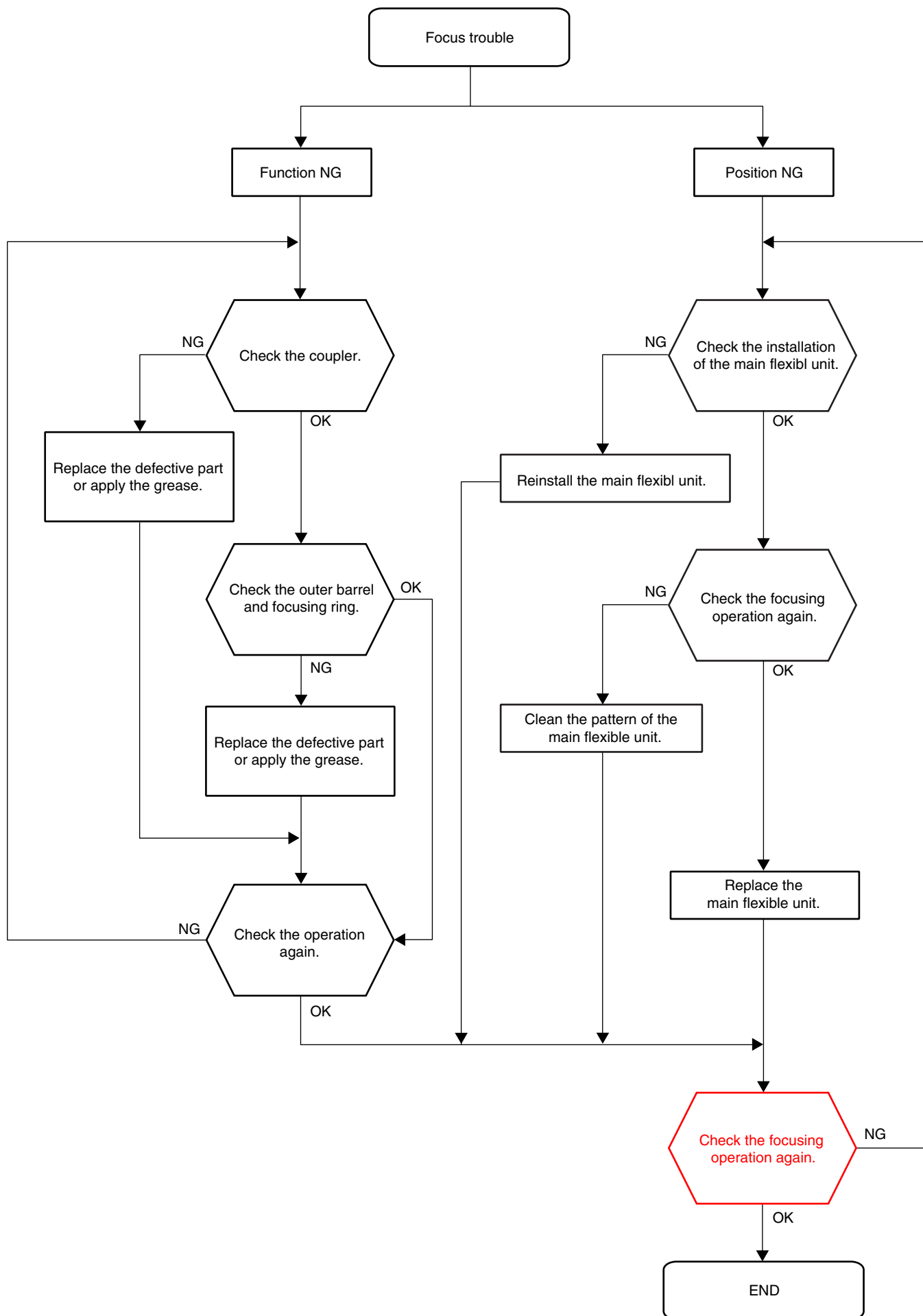
ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFÉS PAR UNE MARQUE  SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

1-5. TROUBLESHOOTING
1-5-1. Aperture Trouble



1-5-2. Focus Trouble

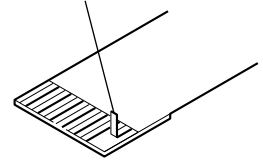


2. DISASSEMBLY

NOTE FOR REPAIR

- Make sure that the flat cable and flexible board are not cracked or bent at the terminal.
Do not insert the cable insufficiently nor crookedly.
- When remove a connector, don't pull at wire of connector. It is possible that a wire is snapped.
- When installing a connector, don't press down at wire of connector.
It is possible that a wire is snapped.
- Do not apply excessive load to the gilded flexible board.

Cut and remove the part of gilt which comes off at the point.
(Be careful or some pieces of gilt may be left inside)

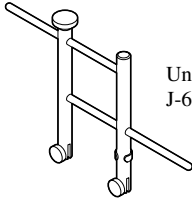
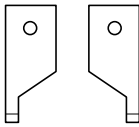
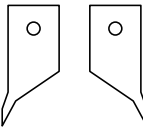


UNIVERSAL WRENCH

In case of the following notches or holes are located in the lens block, etc during disassembling/ assembling the lens, Use the universal wrench.



How to Use

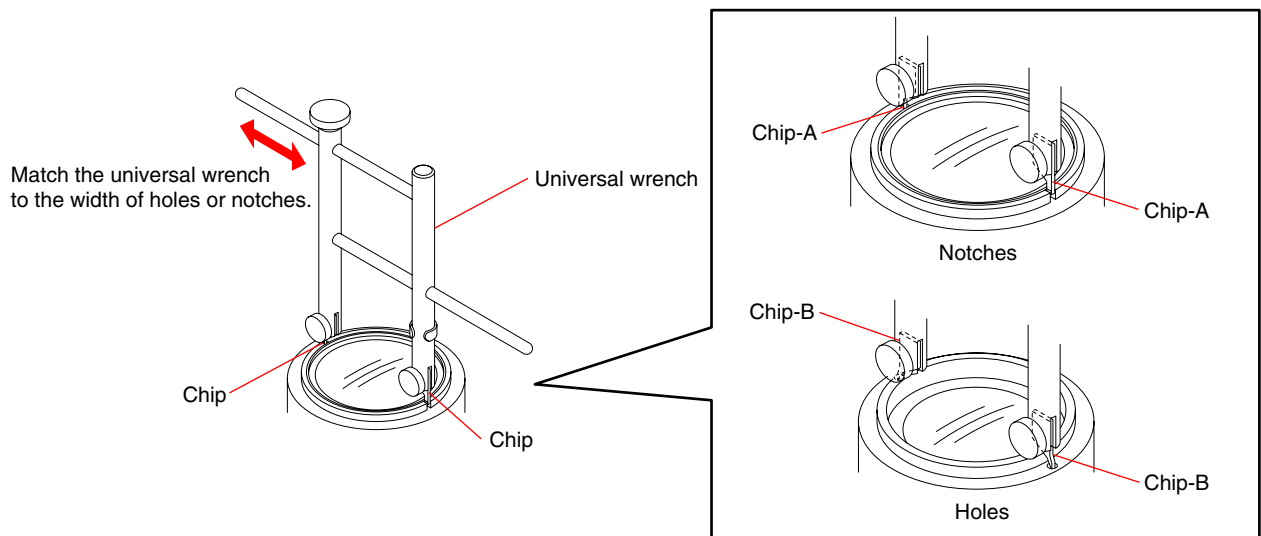
 <p>Universal wrench J-6082-609-A</p>	 <p>Chip-A for universal wrench: J-6082-609-1</p>	 <p>Chip-B for universal wrench: J-6082-609-2</p>
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Attach the chip-A or chip-B to the universal wrench.

For the notches: chip-A

For the holes: chip-B

Match the universal wrench to the holes or notches of the lens block, etc.



2-1. DISASSEMBLY

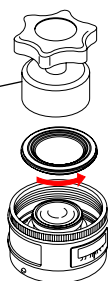
2-1-1. MIRROR TUBE BLOCK, FOCUS RING AND FRONT LENS HOLDER BLOCK

Note:

Remove the G1 stopper ring using the name ring wrench B (49 mm).

Name ring wrench B (49 mm):
J-6082-586-A

Name ring wrench B (49 mm)



EXPLODED VIEW

⑤ Fixed Holding Tube

HELP04

① G1 Stopper Ring

HELP02

② Mirror Tube Block

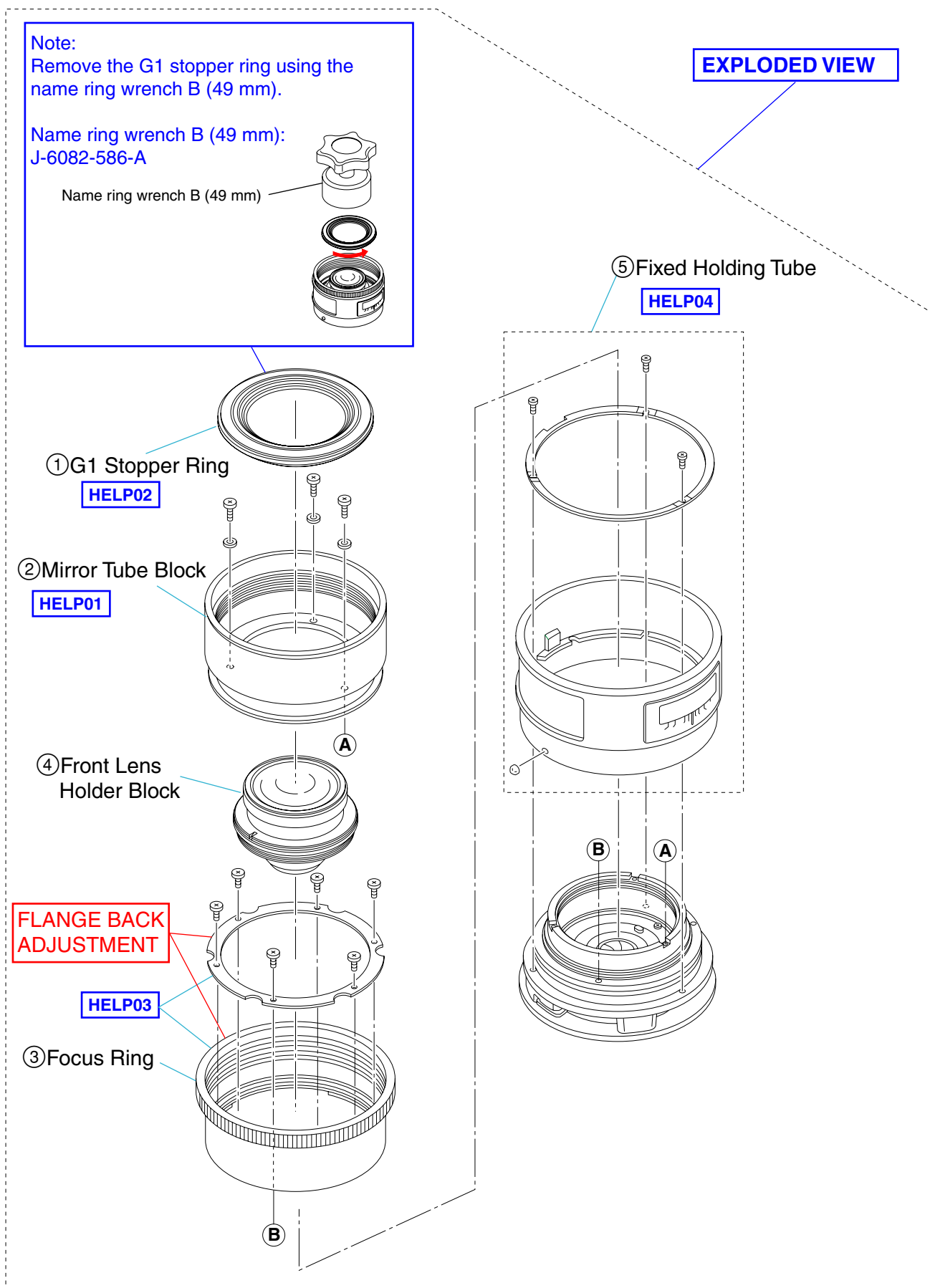
HELP01

④ Front Lens
Holder Block

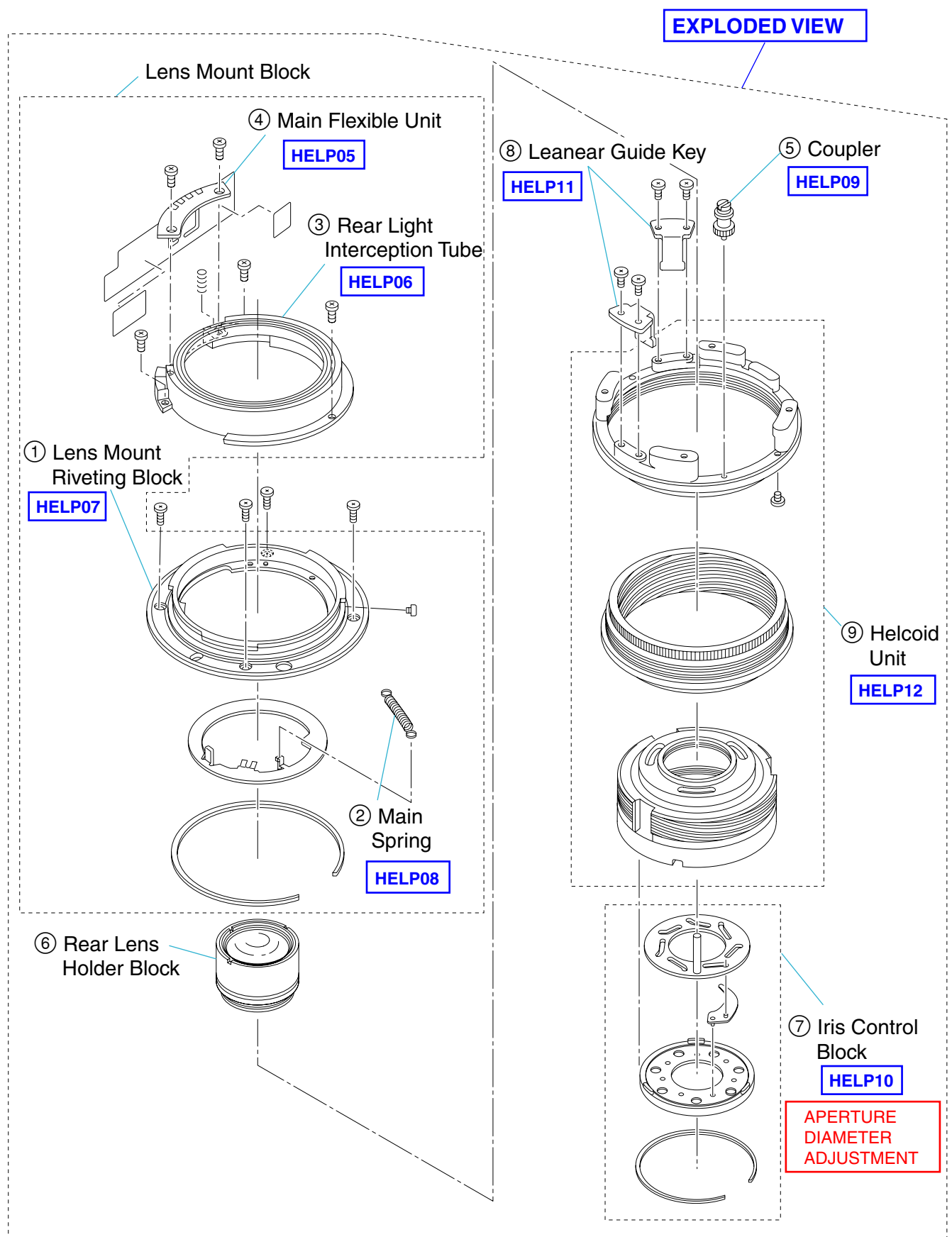
FLANGE BACK
ADJUSTMENT

HELP03

③ Focus Ring



2-1-2. REAR LENS HOLDER BLOCK, HELICOID UNIT AND IRIS CONTROL BLOCK



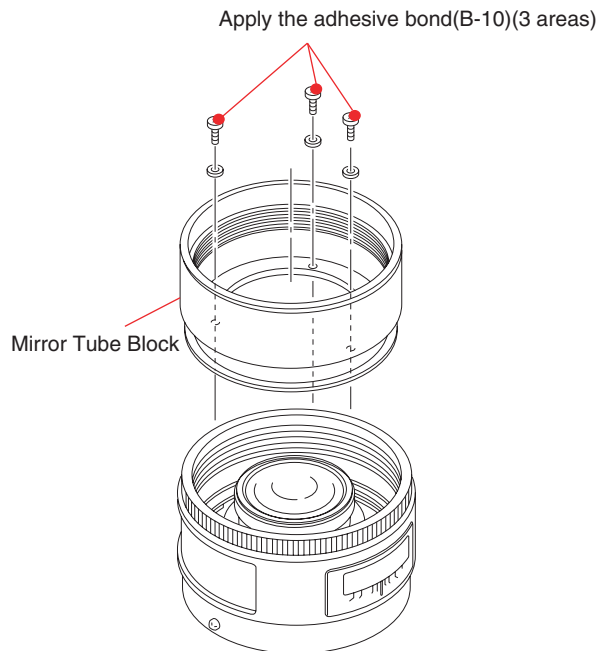
HELP

Note for assembling and grease applying positions are shown.

HELP01

Adhesive bond (B-10): J-6082-612-A

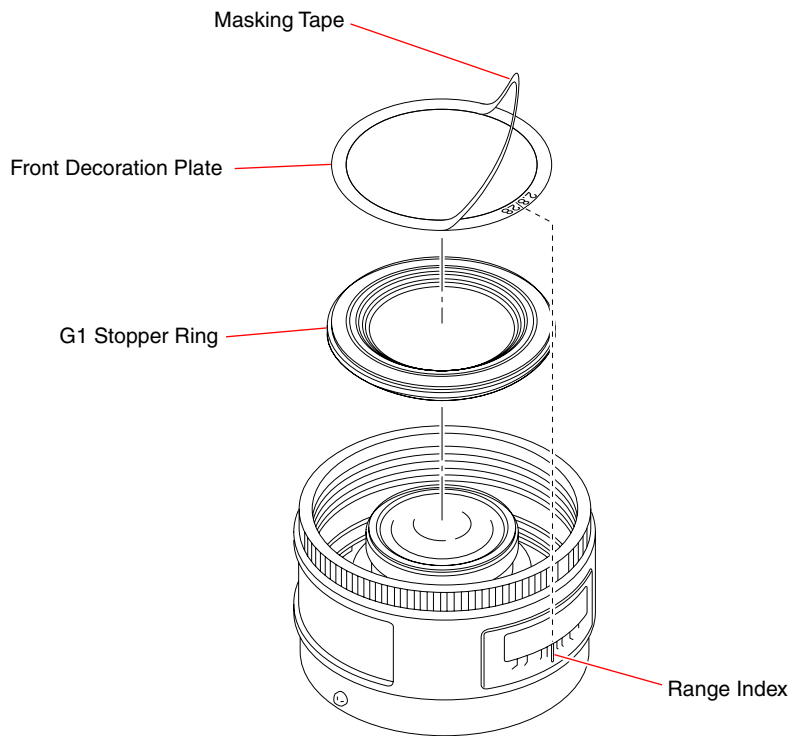
1. Attach the mirror tube block, and fix it with three screws and washers tentatively.
2. Perform the “4-2-1. Aperture Diameter Check”.
3. After the aperture diameter check is completed, fix the hood unit with three screws applying the adhesive bond (B-10) and washers as shown in the figure.



HELP02

1. Align of “f” of “2.8/28” of the front ornamental plate with range index, and stick the front decoration plate onto the G1 stopper ring.
2. Remove the masking tape of the front decoration plate.

Note: Tolerance: $\pm 2.5^\circ \approx \pm 1 \text{ mm}$

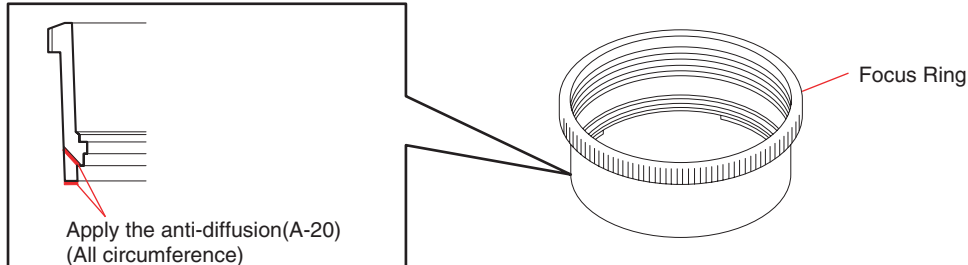


HELP03

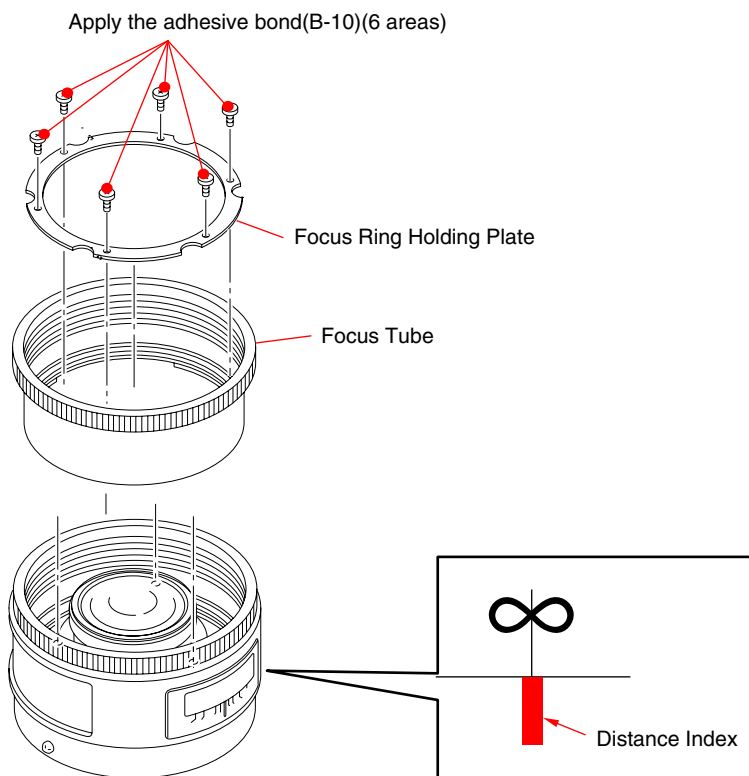
Anti-diffusion agent (A-20): J-6082-611-A

Adhesive bond (B-10): J-6082-612-A

1. Apply the anti-diffusion agent (A-20) to the instruction portions of the focus ring.



2. Attach the focus ring and focus ring holding plate, and then align the edge (∞ side) of the focus scale window with the distance index on the focus scale window. Tighten the three screws as shown in the figure tentatively.
3. Perform the "4-4-2. Flange Back (f'F) Adjustment".
4. After the flange back adjustment is completed, fix the focus ring with six screws applying the adhesive bond (B-10) as shown in the figure.



HELP04

Adhesive bond (LOCTITE 460) (Note)

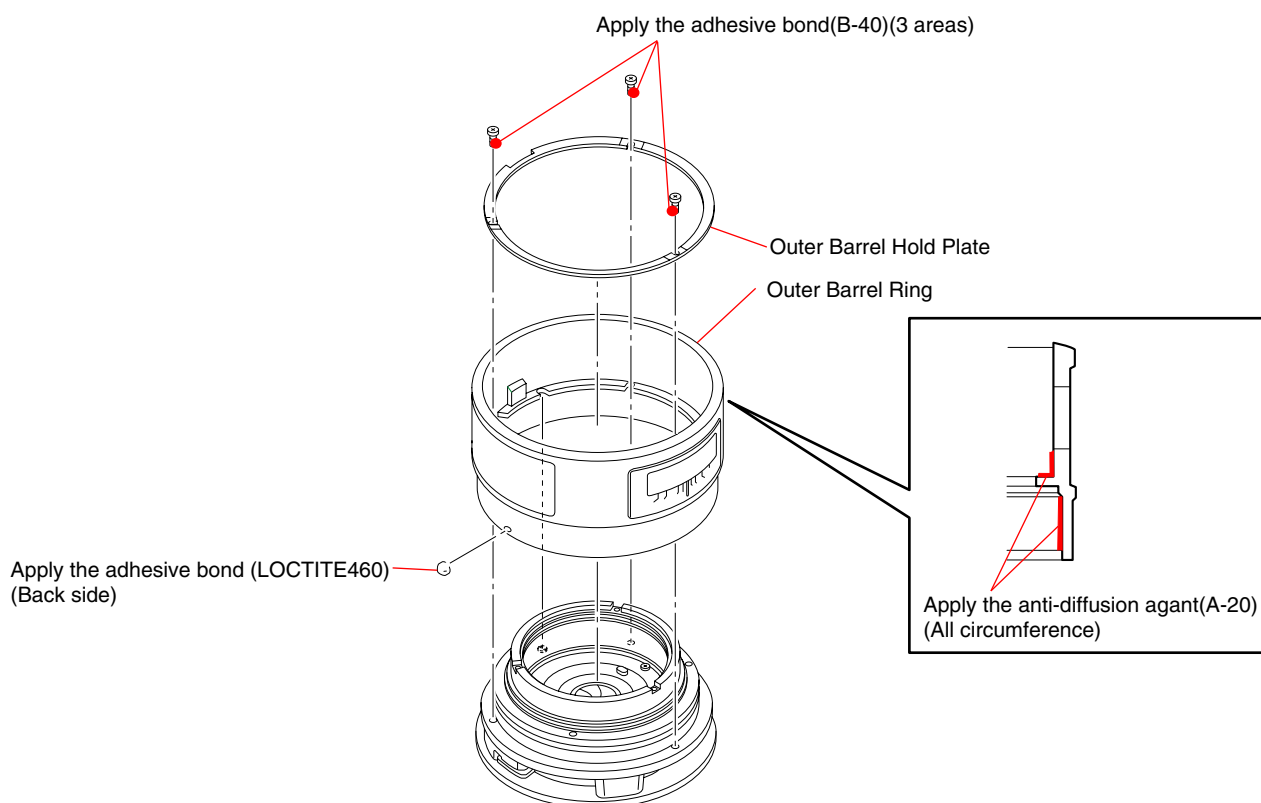
Note: Use adhesive bond (LOCTITE 460) or an equivalent article.

Do not use what becomes white after drying like quick-drying glue.

Anti-diffusion agent (A-20): J-6082-611-A

Adhesive bond (B-40): J-6082-614-A

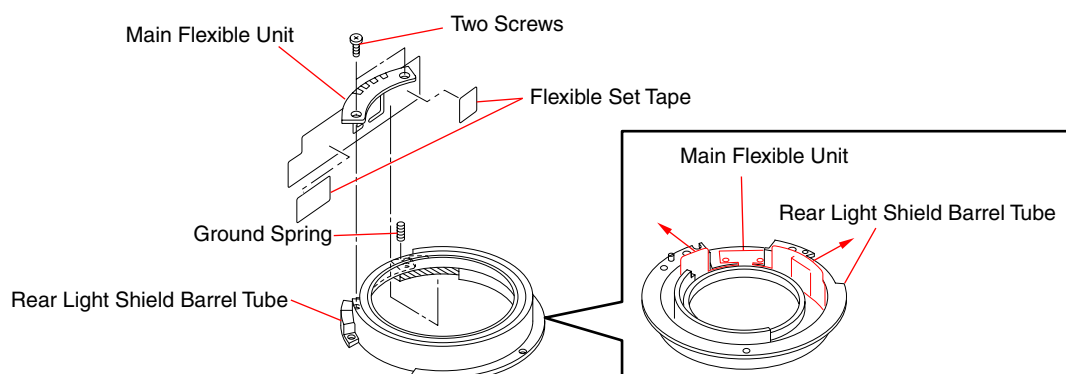
1. Apply the adhesive bond ((LOCTITE 460) to the back side of the mount guide mark, and attach it to the outer barrel ring.
2. Apply the anti-diffusion agent (A-20) to the instruction portions of the outer barrel ring.
3. Attach the outer barrel ring and outer barrel hold plate as shown in the figure. Apply the adhesive bond (B-40) to portion screwed of the three screws and tighten them as shown in the figure.



HELP05

1. Attach the main flexible unit to the rear light shield barrel tube with two screws as shown in the figure.
2. Affix the main flexible unit to flexible set tape as shown in the figure.
3. Bend the main flexible unit to inside of rear light shield barrel tube, fix with the flexible set tape in the arrow direction.

Note: When handling the main flexible unit, take care the static electricity.



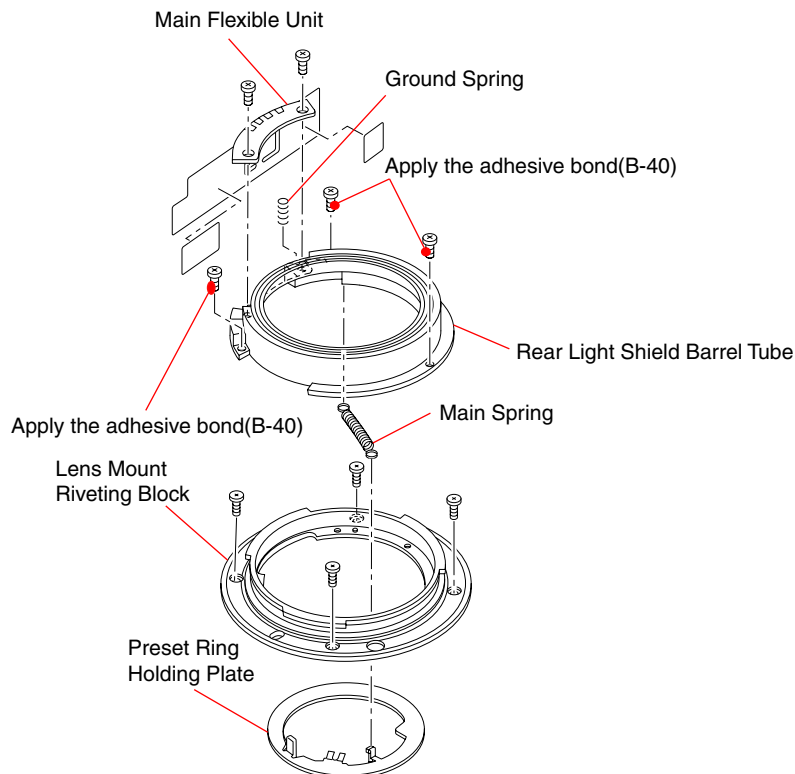
HELP06

Adhesive bond (B-40): J-6082-614-A

1. Hook the main spring to the hook of rear light shield barrel tube and the hook of preset ring holding plate.
2. Attach the rear light shield barrel tube to the lens mount riveting block, apply the bond (B-40) to the screwed portions of three screws shown in figure, and tighten screws.
3. Attach the ground spring to the rear light shield barrel tube and fix the main flexible unit with two screws.

Note: Be careful not to tighten screws too strongly.

Confirm that the preset ring holding plate moves smoothly.



HELP07

Adhesive bond (LOCTITE 460) (Note)

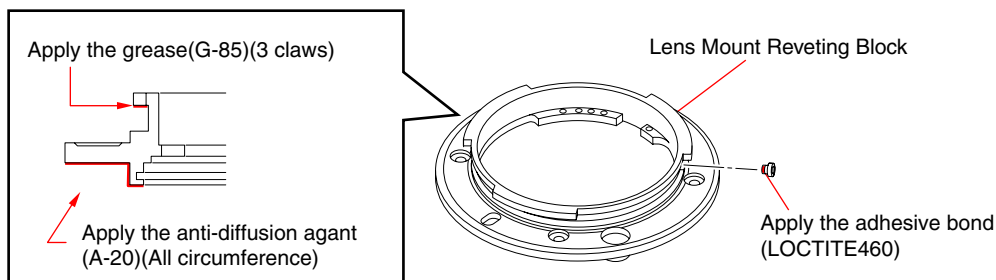
Note: Use adhesive bond (LOCTITE 460) or an equivalent article.

Do not use what becomes white after drying like quick-drying glue.

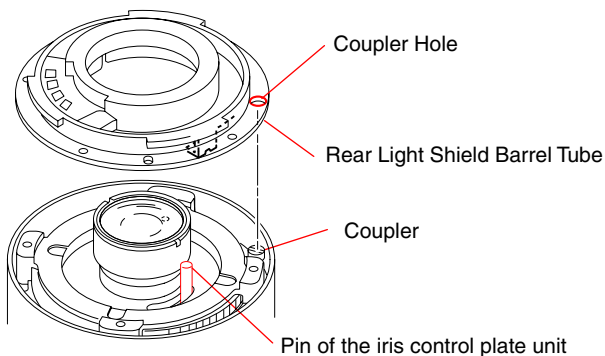
Anti-diffusion agent (A-20): J-6082-611-A

Grease (G-85): J-6082-626-A

1. Apply the adhesive bond ((LOCTITE 460) to the stopper screw, and attach it to the lens mount reveting block.
2. Apply the anti-diffusion agent (A-20) and grease (G-85) to the instruction portions of the lens mount reveting block.



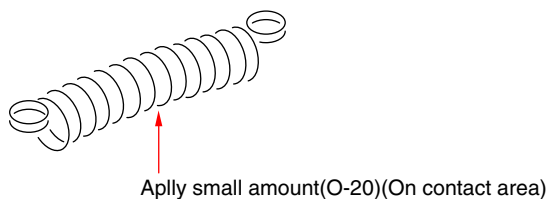
3. Turn counterclockwise the pin of iris control plate unit to close the iris.
4. Attach the lens mount riveting block, aligning the cut portion of preset ring lever with the pin of iris control plate unit and the coupler hole with the coupler.



HELP08

Oil (O-20): J-6082-610-A

Apply small amount of oil (O-20) to the instruction portion of the main spring.

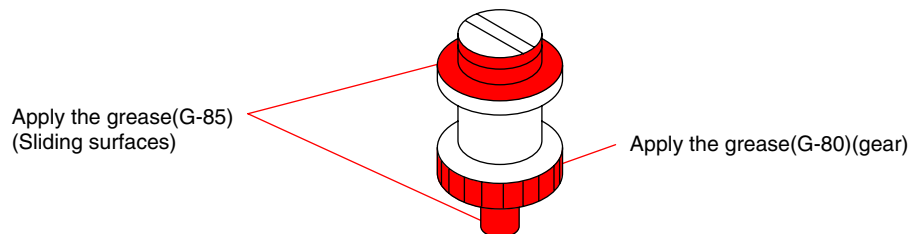


HELP09

Grease (G-80): J-6082-625-A

Grease (G-85): J-6082-626-A

Apply the grease (G-80) to the gear and the grease (G-85) to the sliding surfaces of the coupler.



HELP10

Adhesive bond (B-10): J-6082-612-A

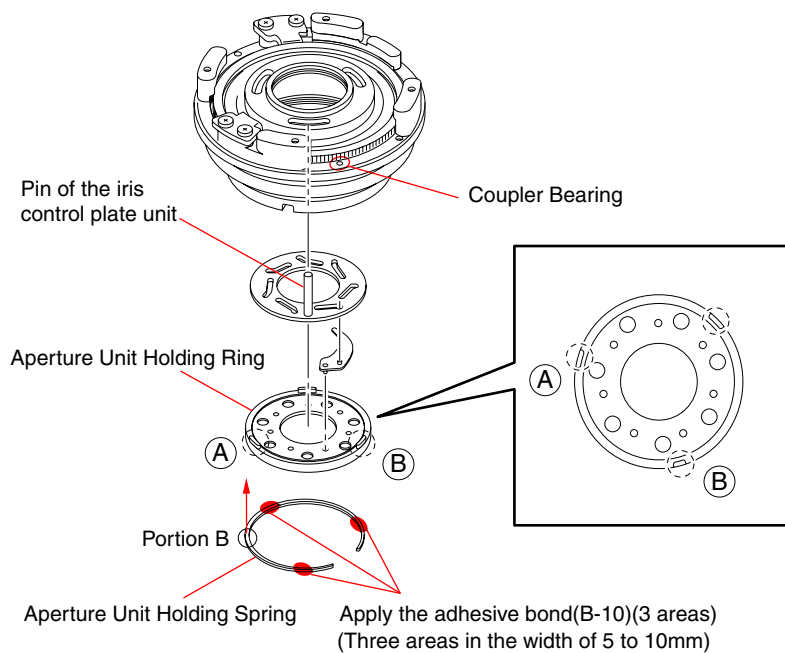
1. Attach the seven iris feather unit to the aperture unit holding ring.

Note: Attach the iris feather unit in fully opening state.

2. Attach the iris control plate unit so that the pin of the iris control plate unit places the mid portion between (A) and (B) of the aperture unit holding ring.
3. Attach the pin of iris control plate unit so that it is inserted in the oblong hole near the coupler pivot of helicoid unit.
4. Attach the aperture unit holding spring, and check the operation of the iris feather unit.

Note: When attaching the aperture unit holding spring, insert the portion B first.

5. After the aperture diameter adjustment is completed, apply the adhesive bond (B-10) to the instruction portions of the aperture unit holding spring.



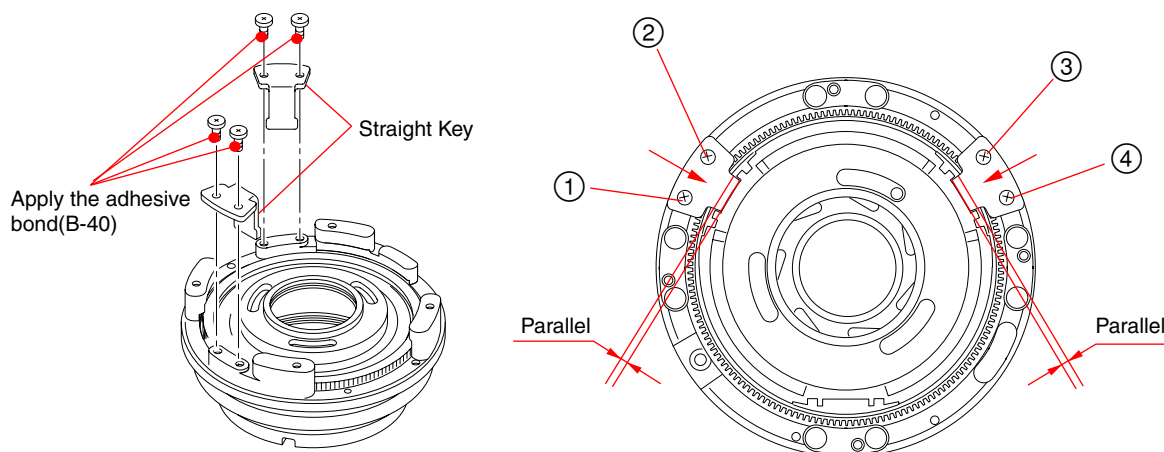
HELP11

Adhesive bond (B-40): J-6082-614-A

1. Align the linear guide key installation block of outside barrel with the linear guide key groove of inner barrel (any 2 locations of 3 locations).
2. Apply the bond (B-40) to the screwed portions of 4 screws shown in the figure and tighten the screws in order of ① to ④.

Note: Push the linear guide key to the inner side (in the arrow direction in the figure) and hold it lightly.

Tighten the screws while making the linear guide key and inner barrel in parallel, Rotate the inner helicoid barrel and confirm that it rotates smoothly.



HELP12

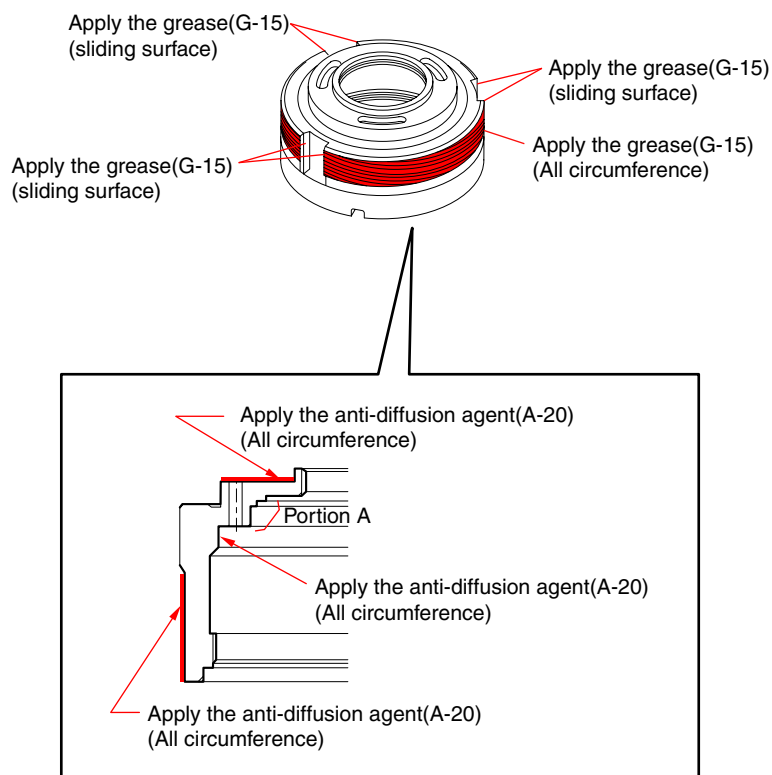
Anti-diffusion agent (A-20): J-6082-611-A

Adhesive bond (B-40): J-6082-614-A

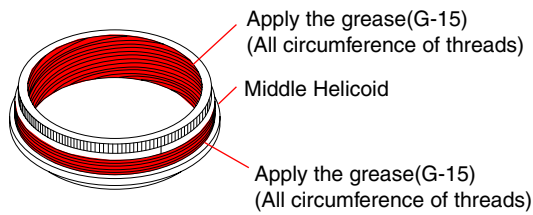
Grease (G-15): J-6082-619-A

1. Apply the grease (G-15) and the anti-diffusion agent (A-20) to the instruction portions of the inner tube.

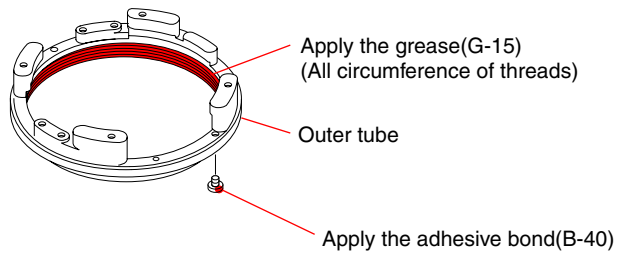
Note: Be careful not to get the anti-diffusion agent (A-20) smeared to the portion A.



2. Apply the grease (G-15) to the instruction portion of the middle helicoid.

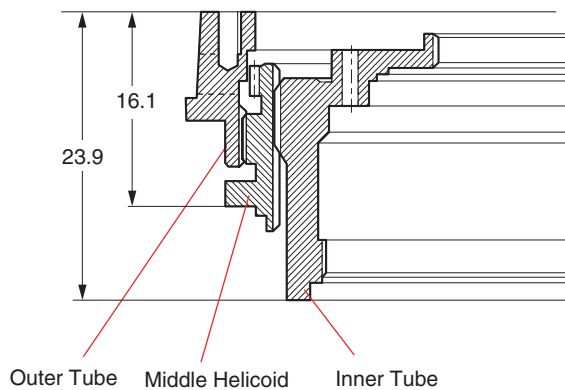


3. Apply the adhesive bond (B-40) to the stopper screw, and tighten it to the outer tube.
4. Apply the grease (G-15) to the instruction portion of the outer tube.



5. Assemble the outer tube, middle helicoid and inner tube, and check the operation of the helicoid (stiffness, smoothness, catching).
6. Set the helicoid level as shown in the figure.

Note: This level is in infinity position.



3. REPAIR PARTS LIST

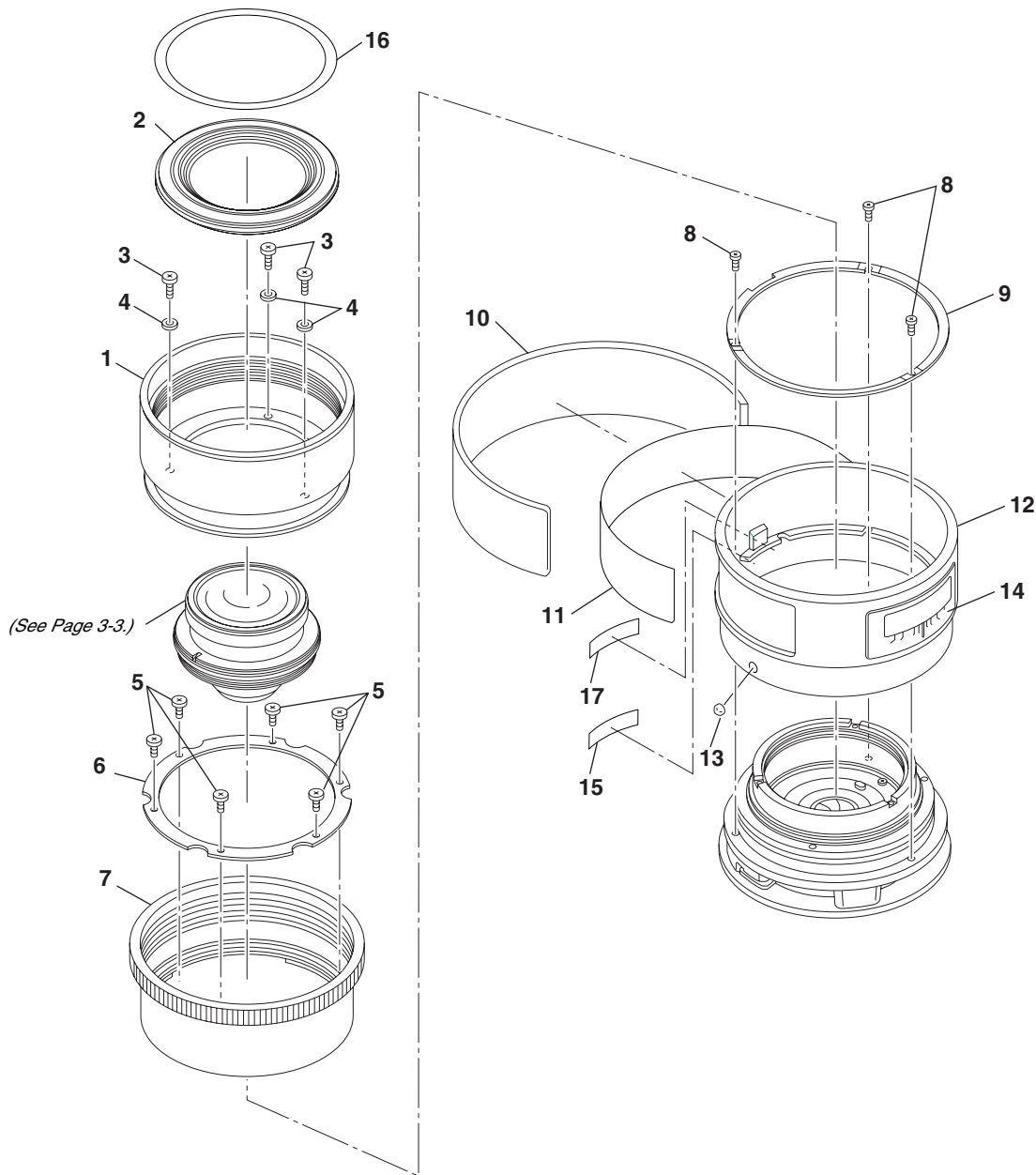
DISASSEMBLY

NOTE:

- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

3-1. EXPLODED VIEWS

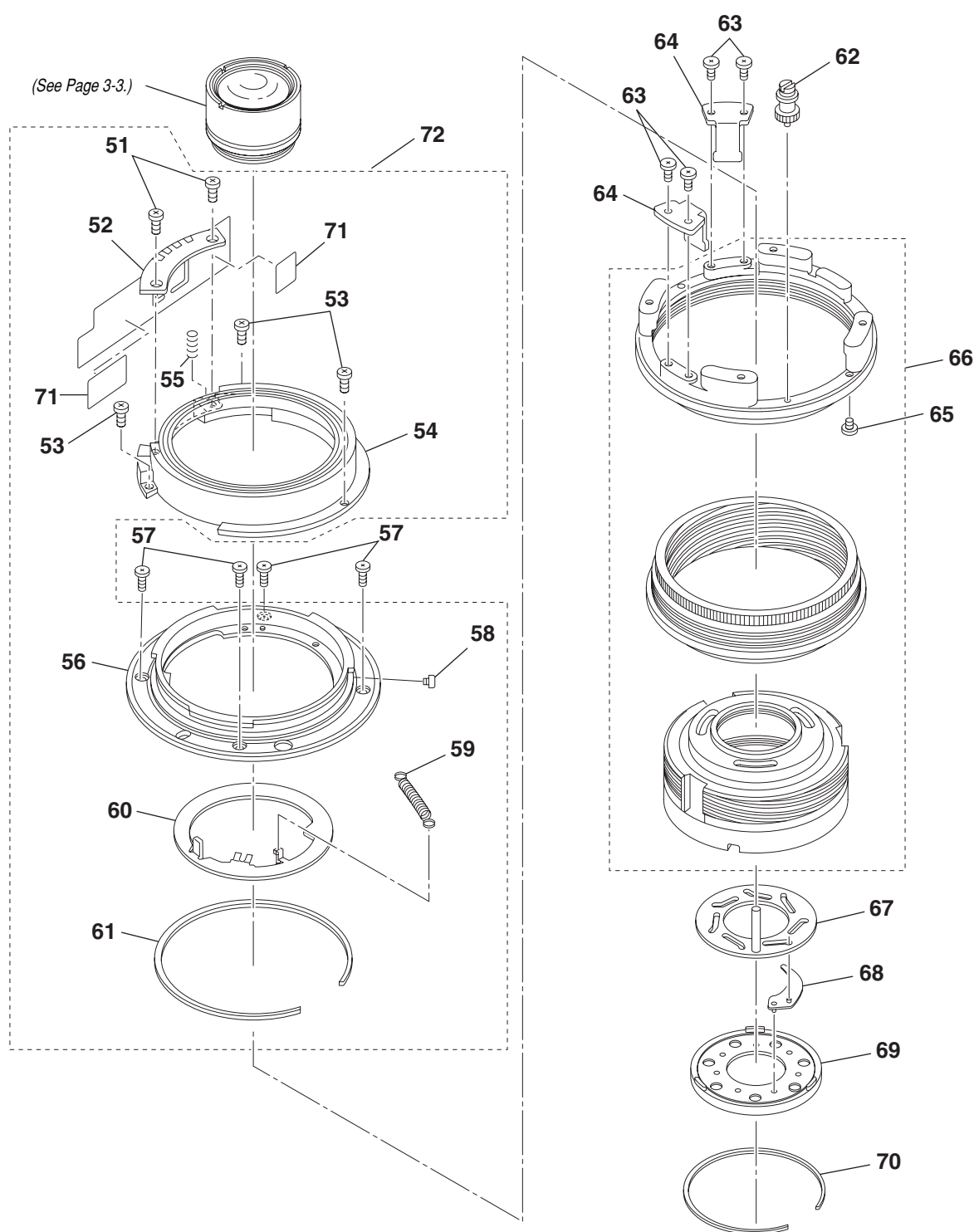
3-1-1. MIRROR TUBE BLOCK, FOCUS RING AND FRONT LENS HOLDER BLOCK



Ref. No.	Part No.	Description
1	A-1206-281-A	BLOCK, TUBE, MIRROR TUBE
2	2-693-086-01	RING (G1 STOPPER)
3	2-693-099-01	TAPPING SCREW 1.7 M1.7 X4.0
4	2-693-100-01	WASHER
5	2-685-020-01	SCREW (SET SCREW A)
6	2-693-094-01	PLATE (FOCUS RING HOLDING PLATE)
7	2-693-085-01	FOCUS RING
8	2-684-120-01	SCREW M1.6 X 4.0
9	2-691-955-01	OUTER BARREL HOLD PLATE

Ref. No.	Part No.	Description
10	2-691-944-01	SHEET (HOLD SHEET)
11	2-691-943-01	HOLD SHEET TAPE
12	2-693-084-01	RING (OUTER BARREL)
13	2-683-692-01	CHIP (MOUNT INDEX)
14	A-1197-687-A	UNIT(FOCUS SCALE WINDOW UNIT)
15	2-684-073-01	LENS NO. PLATE
16	2-888-237-01	FRONT DECORATION PLATE
17	2-695-852-01	LABEL, MODEL NAME

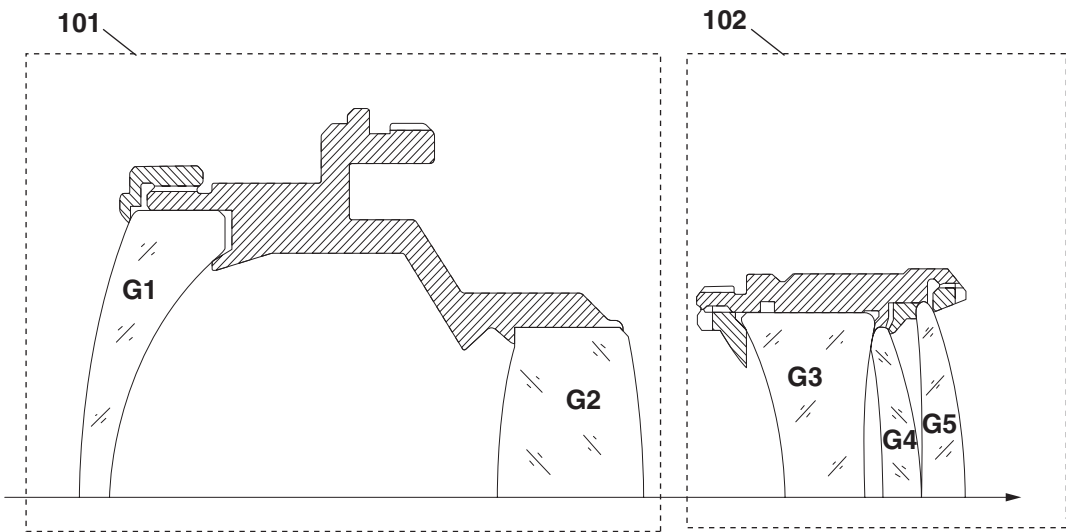
3-1-2. REAR LENS HOLDER BLOCK, HELICOID UNIT AND IRIS CONTROL BLOCK



Ref. No.	Part No.	Description
51	2-684-066-01	TAPPING SCREW 1.7 M1.7 X 4.0
52	A-1197-688-A	DIAGRAM (MAIN FLEXIBLE UNIT)
53	2-684-064-01	SCREW M1.4 X2.2
54	2-691-904-01	TUBE (REAR LIGHT SHIELD BARREL)
55	2-684-065-01	GROUND SPRING
56	A-1212-862-A	BLOCK, LENS MOUNT RIVETING
57	2-687-685-01	SCREW M2.0 X 4.0
58	2-684-244-01	STOPPER SCREW
59	2-691-960-01	MAIN SPRING
60	2-691-959-01	RING (PRESET RING)
61	2-684-234-01	PRESET RING HOLDING PLATE

Ref. No.	Part No.	Description
62	2-685-022-01	COUPLER
63	2-684-731-01	SCREW M1.6 X3.5
64	2-693-093-01	LINEAR GUIDE KEY
65	2-685-018-01	HOLD SCREW
66	A-1215-252-A	HELICOID UNIT
67	A-1197-684-A	PLATE UNIT, IRIS CONTROL
68	A-1197-686-A	FEATHER UNIT, IRIS
69	2-693-070-01	APERTURE UNIT HOLDING RING
70	2-693-097-01	APERTURE UNIT HOLDING SPRING
71	2-887-835-01	TAPE, FLEXIBLE SET
72	A-1206-283-A	BLOCK, LENS MOUNT

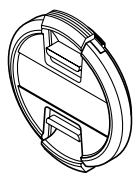
3-1-3. FRONT LENS HOLDER BLOCK AND REAR LENS HOLDER BLOCK



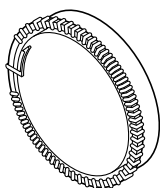
Ref. No.	Part No.	Description
101	A-1197-689-A	BLOCK, FRONT LENS HOLDER (LEAD FREE)
102	A-1197-690-A	BLOCK, REAR LENS HOLDER (LEAD FREE)

3-2. SUPPLIED ACCESSORIES

Checking supplied accessories.



Front Lens Cap
2-687-232-01



Rear Lens Cap
2-683-615-01

Other accessories

2-685-159-11 MANUAL, INSTRUCTION (ENGLISH) (US, CND, AEP)

2-685-159-21 MANUAL, INSTRUCTION (FRENCH) (US, CND, AEP)

2-685-159-31 MANUAL, INSTRUCTION (GERMAN) (AEP)

2-685-159-41 MANUAL, INSTRUCTION (SPANISH) (US, CND, AEP)

2-685-159-51 MANUAL, INSTRUCTION (DUTCH) (AEP)

2-685-159-61 MANUAL, INSTRUCTION (SWEDISH) (AEP)

2-685-159-71 MANUAL, INSTRUCTION (ITALIAN) (AEP)

2-685-159-81 MANUAL, INSTRUCTION (PORTUGUESE) (AEP)

2-685-159-91 MANUAL, INSTRUCTION (RUSSIAN) (AEP)

2-685-160-11 MANUAL, INSTRUCTION

(TRADITIONAL CHINESE, SIMPLIFIED CHINESE) (AEP, CH)

2-685-160-21 MANUAL, INSTRUCTION (KOREAN, ARABIC) (AEP)

- Abbreviation
CH: chinese model

4. ADJUSTMENTS

Note: After the service repair, perform the adjustments referring to this section.

4-1. PREPARATIONS

4-1-1. List of Service Tools and Equipments

- Variable Transformer (Output voltage: AC 100 V) (Note 3)
- Camera DSLR-A100
- Compact Flash (CF) Card (For image saving)
- Screen (Art paper)
- Tape Measure
- Plane Mirror (For SLRs)
- Adhesive bond (B-10): J-6082-612-A
- Color Calculator 2

Note: Color Calculator 2 is downloadable from the ESI homepage.


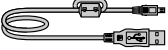
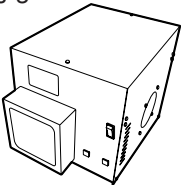

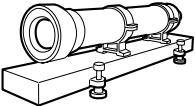
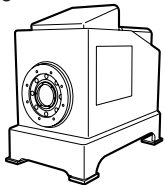
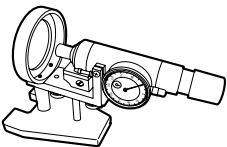
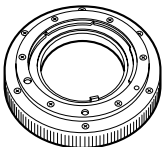
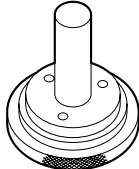
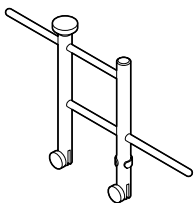
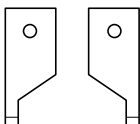
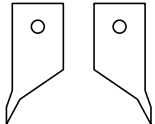
<p>J-1</p>  <p>Personal computer (Note 1)</p>	<p>J-2</p>  <p>USB cord with connector 1-833-062-11</p>	<p>J-3</p>  <p>Luminance box J-6082-581-A</p>
<p>J-4</p>  <p>AE master lens J-6082-597-A</p>	<p>J-5</p>  <p>1000 mm Collimator 110V: J-6082-604-A 240V: J-6082-604-B (Note 2)</p>	<p>J-6</p>  <p>Lens test projector J-6082-605-A (Note 3)</p>
<p>J-7</p>  <p>Flange back tester J-6082-606-A</p>	<p>J-8</p>  <p>A-mount attachment J-6082-607-A</p>	<p>J-9</p>  <p>Flange back gauge (43.50mm) J-6082-608-A</p>
<p>J-10</p>  <p>Universal wrench J-6082-609-A</p>	<p>J-11</p>  <p>Chip-A for universal wrench J-6082-609-1</p>	<p>J-12</p>  <p>Chip-B for universal wrench J-6082-609-2</p>

Fig. 4-1-1

Note 1: Personal Computer (PC)
(Color Calculator 2 installed)
OS: Windows2000 Professional/XP
MEMORY: 40 M Byte or more recommended
Hard disk free area: 15 M Byte or more recommended
USB terminal: Standard equipment
Graphics: 32,000 colors or more recommended VGA monitor

Note 2: Attach the chart to the 1000 mm collimator as shown in Fig. 4-1-2.

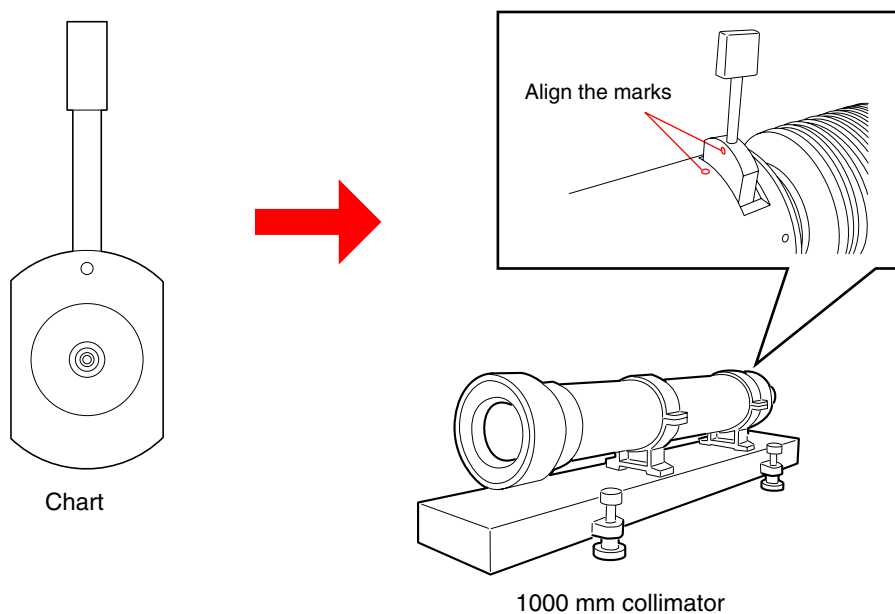


Fig. 4-1-2

Note 3: Connect the variable transformer (Output voltage: AC 100 V) to the lens test projector.

4-1-2. Lens Adjustment Program

The lens adjustment program is required for the following check/adjustment.

4-5. LENS ROM CHECK

Prepare/start the Lens adjustment program with the following steps.

Equipment

- Personal Computer (PC)
- Camera DSLR-A100
- USB Cord With Connector
- Lens Adjustment Program

Note: Lens Adjustment Program is downloadable from the ESI homepage.

1. Installation of the Lens Adjustment Program

For installation of the lens adjustment program, refer to the link “• Preparing the DSLR-A100 adjustment program” described on the top cover of the camera DSLR-A100 service manual “9-852-130-51”.

Note: Store the lens adjustment program “LensAdjustment.exe” and related file “AlphaLensAdjust.txt” in the folder that contains the DSLR-A100 adjustment program “DSLRadj_cs.exe”.

2. Start the Lens Adjustment Program

- 1) Connect the camera and PC with the USB cord with connector.
- 2) Set the mode dial of camera to “M”.
- 3) Turn the POWER switch of the camera to OFF, then turn the POWER switch to ON while pressing the shutter button halfway down with pressed the ▲ button of controller keys and MENU buttons.
- 4) Check that the remaining number of recordable images on the LCD monitor is “BBBB”.

Note: When “BBBB” is displayed, the camera activates in the adjustment mode.

- 5) Start the lens adjustment program “LensAdjustment.exe”.

4-2. APERTURE DIAMETER CHECK/ADJUSTMENT

4-2-1. Aperture Diameter Check

Note: Perform the aperture diameter check in the state of the Fig.4-2-1 (only the G1 stopper was removed), or completion of assembling.

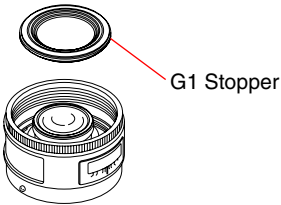


Fig.4-2-1

Equipment

- Luminance Box
- Camera DSLR-A100
- AE Master Lens
- Compact Flash (CF) Card (For image saving)
- Personal Computer (PC)
(Color Calculator 2 installed)

1. Preparations

- 1) Install the CF card to the camera.
- 2) Set the equipments, camera and master lens as shown in Fig.4-2-2.

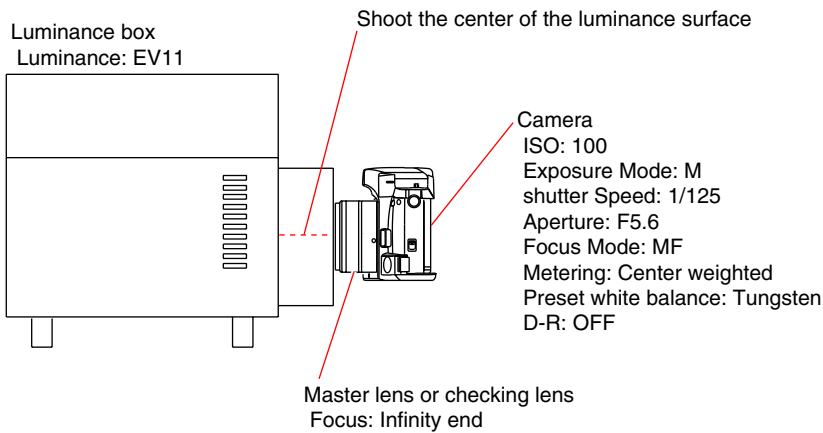


Fig.4-2-2

- 3) Shoot the images under the following conditions and save them.

Note: Shoot the center of the luminance surface three times with the master lens and checking lens.

Setting of Luminance box:

Luminance: EV11

Setting of Lens:

Focus: Infinity end

Setting of Camera:

ISO: 100
Exposure Mode: M
shutter Speed: 1/125
Aperture: F5.6
Focus Mode: MF
Metering: Center weighted
Preset white balance: Tungsten
D-R: OFF

2. Checking of Image

Note: Check the image of both master lens and checking lens.

- 1) Start the Color Calculator 2.

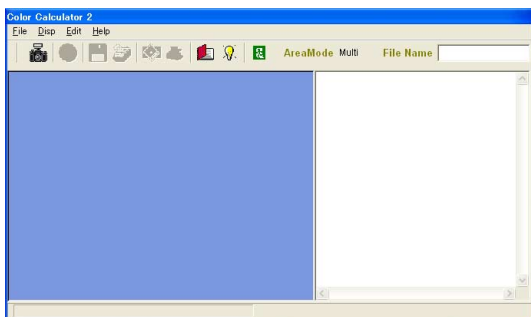


Fig.4-2-3

- 2) Read the image from the file menu.

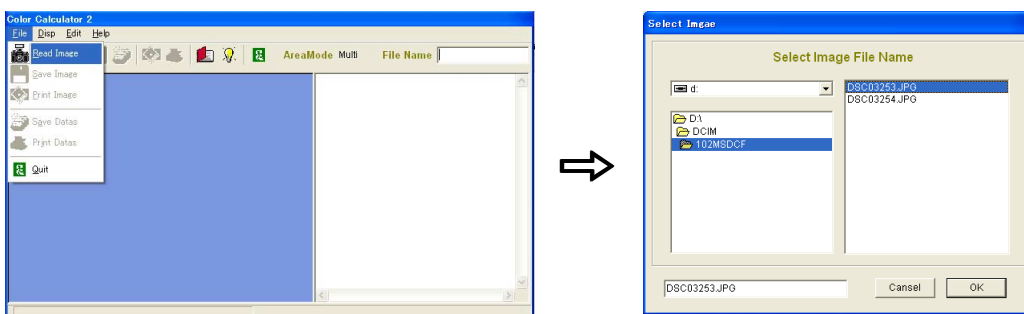


Fig.4-2-4

- 3) Set the Color Calculator 2 as follows.

Measured value display (Display menu): RGB+L*a*b*

Measuring method (Display menu): Center Single Area

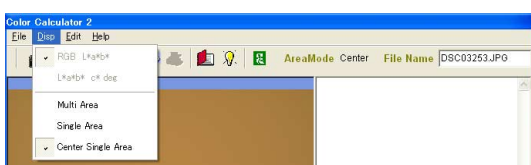


Fig.4-2-5

Color space (Edit menu): sRGB



Fig.4-2-6

Area size for calculate (Edit menu → Option): 256×256 Pixels

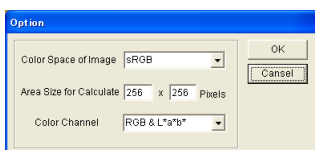


Fig.4-2-7

- 4) Click the calculate button to measure the image.
- 5) After measuring, check the “G” values.
 Average “G” value of the three images shoot with master lens: (a)
 Average “G” value of the three images shoot with checking lens: (b)

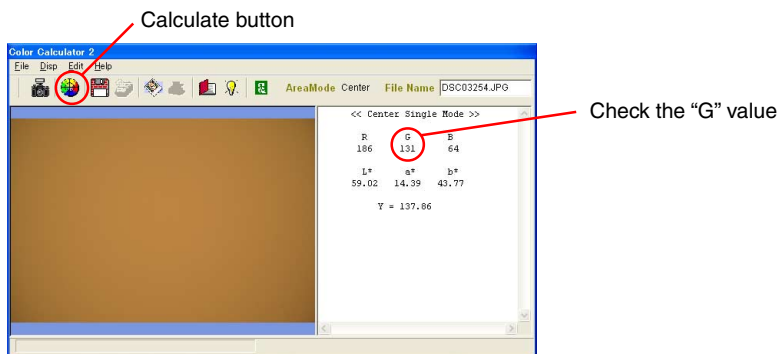


Fig.4-2-8

3. Checking Method

- 1) Calculate aperture error using the following formula, and check that the aperture error is within the specification.

$$\text{Aperture error} = \text{Average "G" value of master lens (a)} - \text{Average "G" value of checking lens (b)}$$

Specification

$$\text{Aperture error} = 0 \pm 12$$

- 2) When the aperture error is out of specification, perform “4-2-2. Aperture Diameter Adjustment”.

4-2-2. Aperture Diameter Adjustment

Equipment

- Luminance Box
- Camera DSLR-A100
- AE Master Lens
- Compact Flash (CF) Card (For image saving)
- Personal Computer (PC)
(Color Calculator 2 installed)
- Adhesive bond (B-10)

1. Adjustment Method

- 1) Disassemble or assemble the checking lens into the state of Fig.4-2-9.

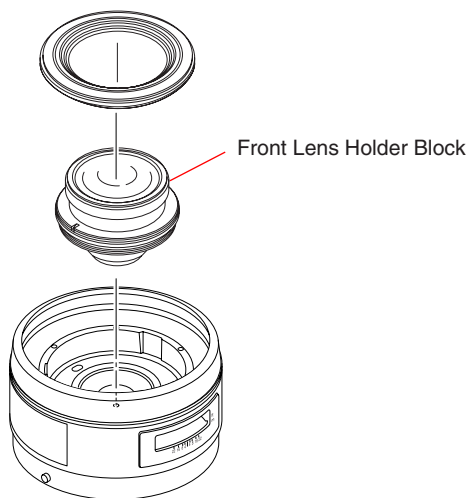


Fig.4-2-9

- 2) Remove the adhesive bond fixing the aperture unit holding spring.

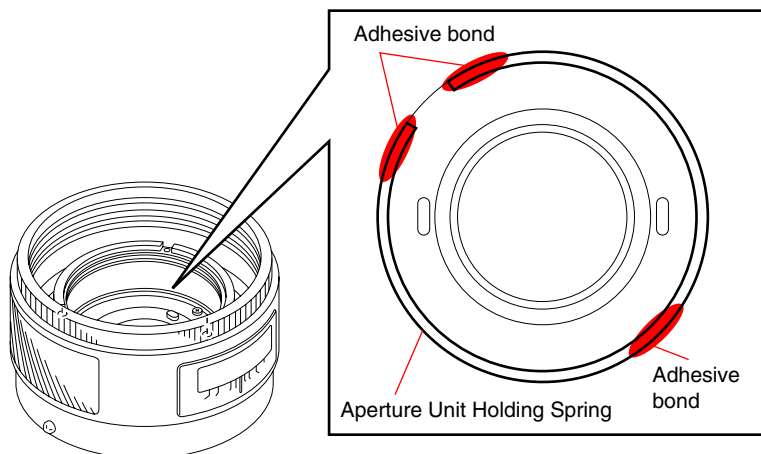


Fig.4-2-10

- 3) Move the preset lever to set the preset ring at the open aperture position.

Set the preset ring at the open aperture position.

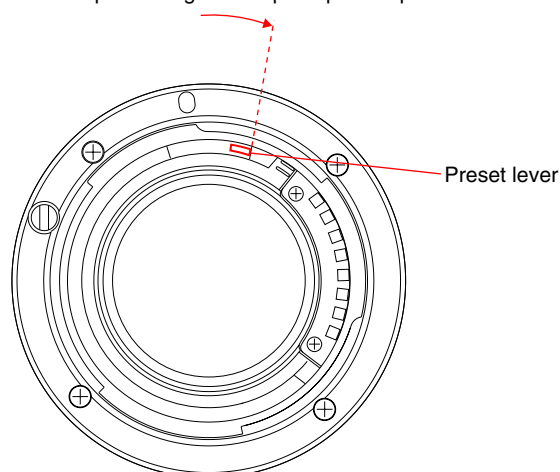


Fig.4-2-11

- 4) Turn the aperture unit holding ring to adjust the position that the iris feather unit are hidden into the edge completely.

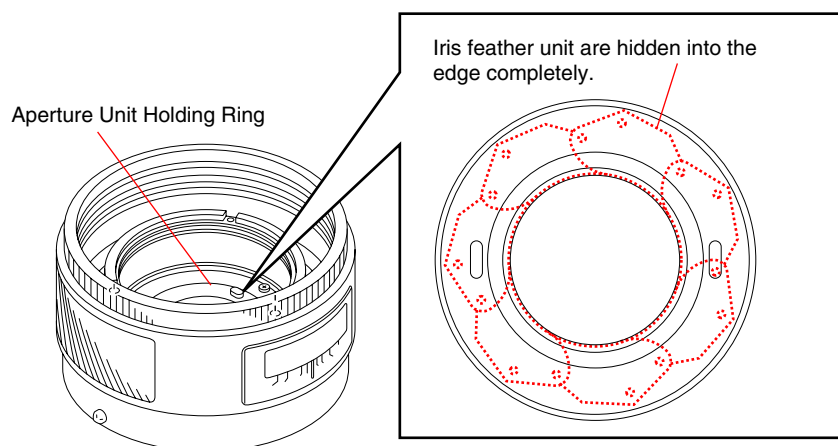


Fig.4-2-12

- 5) After the adjustment is completed, apply the adhesive bond (B-10) as shown in the Fig.4-2-13.

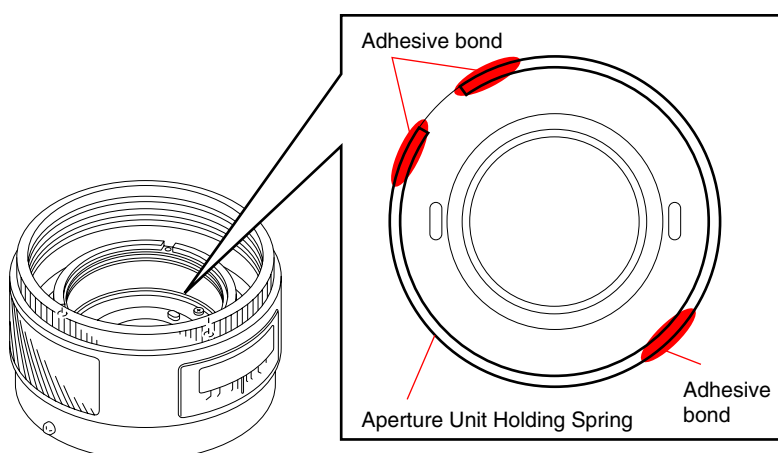


Fig.4-2-13

- 6) Assemble the lens completely.
- 7) Perform “4-2-1. Aperture Diameter Check”, and repeat “4-2-1. Aperture Diameter Check” and “4-2-2. Aperture Diameter Adjustment” until the aperture error is within the specification.

4-3. PROJECTIVE RESOLVING POWER CHECK

Equipment

- Lens Test Projector and Variable Transformer (Output voltage: AC 100 V)
Note: Connect the variable transformer (Output voltage: AC 100 V) to the lens test projector.
- A-mount Attachment
- Screen (Art paper)
- Tape Measure
- Plane Mirror (For SLRs)

1. Preparations

Note: Check the projective resolving power of the checking lens at the following focal-length and distance.

Focal-length f (mm)	distance (m)
28	0.8 to 1.16

Table 4-3-1

- 1) Perform the following steps (1) to (3), and incorporate the internal lenses of the lens test projector according to the checking focal-length.
- (1) Open the lid of the lens test projector.
 - (2) Pull up and turn the fixed levers on the right and left sides of the lens test projector.
 - (3) Remove or insert the lens.

Note: Be sure to have the right position and direction of the lens.

Incorporate of the lenses according to the checking focal-length (f).

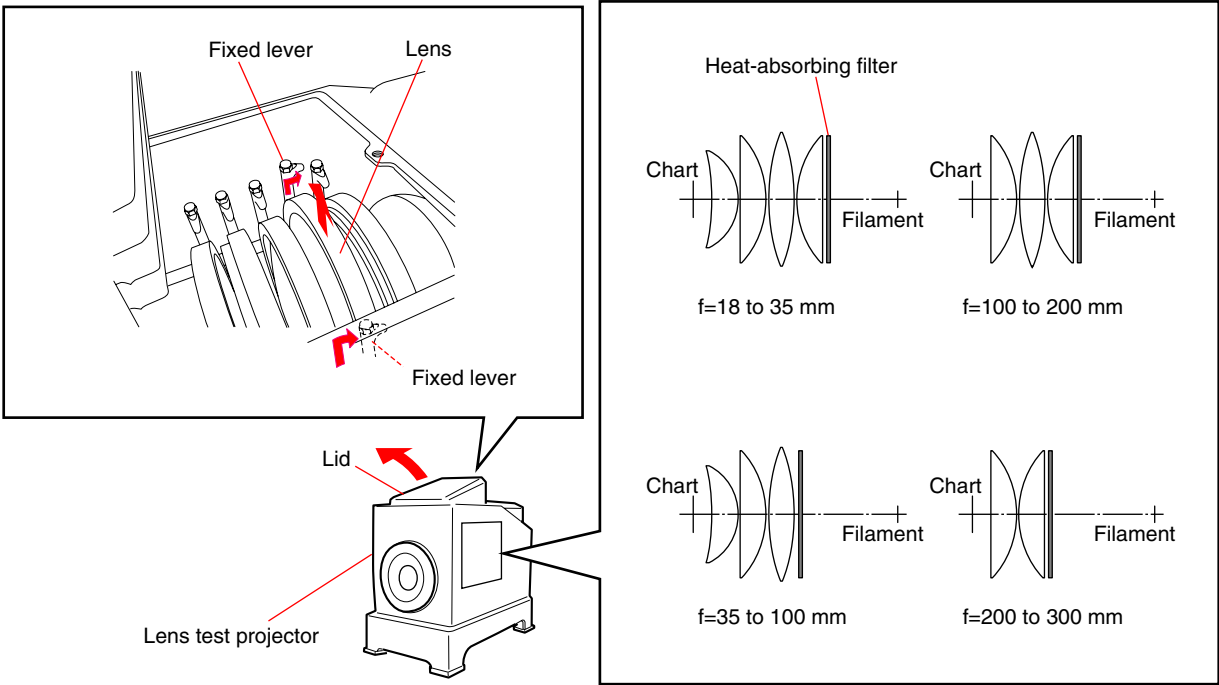


Fig.4-3-1

- 2) Attach the checking lens to the lens test projector, and set the equipments as shown in Fig.4-3-2.
- 3) Turn the fan switch of the lens test projector to ON, then turn the lamp switch to ON.

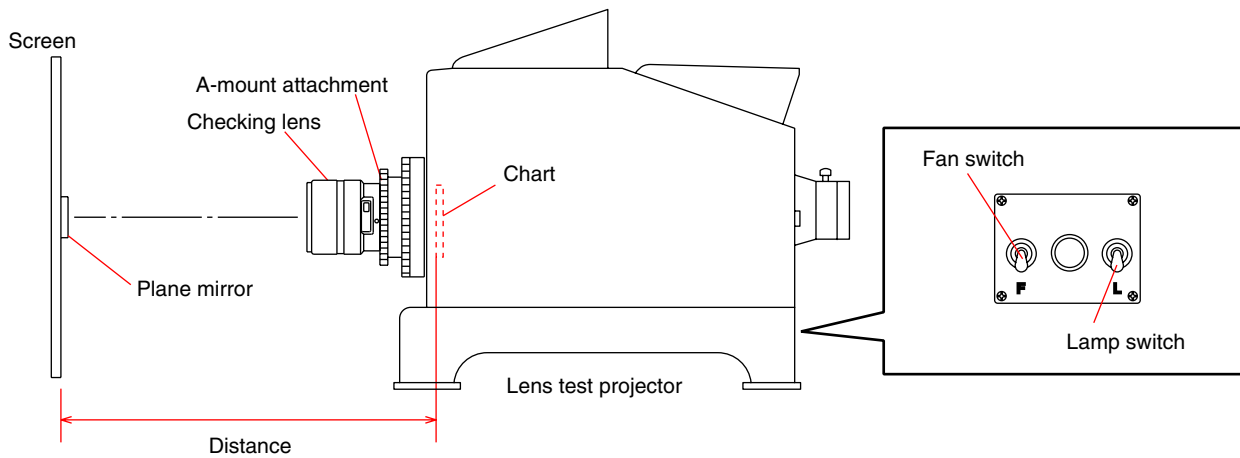


Fig.4-3-2

- 4) Turn the distance tube of the checking lens until the chart image projected on the screen is the sharpest at the center ($y'=0$).
- 5) Set the plane mirror to the center of the projected image ($y'=0$), and adjust the projector position so that the mirror reflects the light to the center of the lens.

2. Checking Method

- 1) Turn the distance tube of the checking lens until the chart image projected on the screen is the sharpest at the center ($y'=0$).
- 2) Read the number of the smallest pitched lines at the center ($y'=0$).

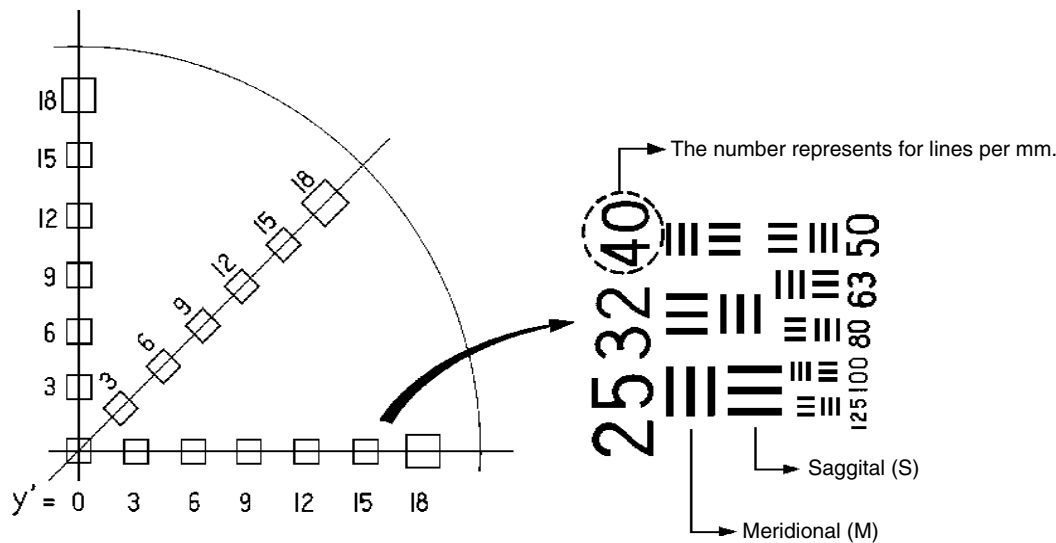


Fig.4-3-3

- 3) Turn the mount rotation ring of lens test projector until the projected image at a certain peripheral point ($y'=15$) on the screen appears the most unsharp.

Read the number of the smallest pitched lines (both sagittal and meridional: 3 lines) at the peripheral point.

Note: When reading the number of the smallest pitched lines, be careful of the spurious resolution.

Spurious resolution is the reversed image of 2 or 4 lines which appears on screen when focus is beyond maximum revolving power.

Do not confuse spurious resolution for the smallest pitched lines.

Correct resolution



Spurious resolution

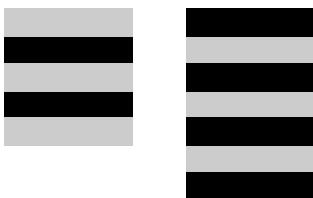


Fig.4-3-4

- 4) Check that the all readings ($y'=0$, sagittal (S) and meridional (M) at $y'=15$) is within the specification of the Table 4-3-2.

When the specification is not satisfied, perform the following procedure.

- Replace the front lens holder block or rear lens holder block

Specification

Focal-length f (mm)	distance (m)	Number of the smallest pitched lines		
		Center ($y'=0$) (Lines per mm)	$y'=15$	
			S	M
28	0.8 to 1.16	125 or greater	63 or greater	40 or greater

Table 4-3-2

- 5) After the checking is completed, turn the lamp switch of the lens test projector to OFF and cool the inside of the lens test projector, then turn the fan switch to OFF.

4-4. FLANGE BACK (f'F) CHECK/ADJUSTMENT

4-4-1. Flange Back (f'F) Check

Equipment

- 1000 mm Collimator
- Flange Back Tester
- A-mount Attachment
- Flange Back Gauge (43.50mm)

1. Preparations

- 1) Set the equipments as shown in the Fig.4-4-1.

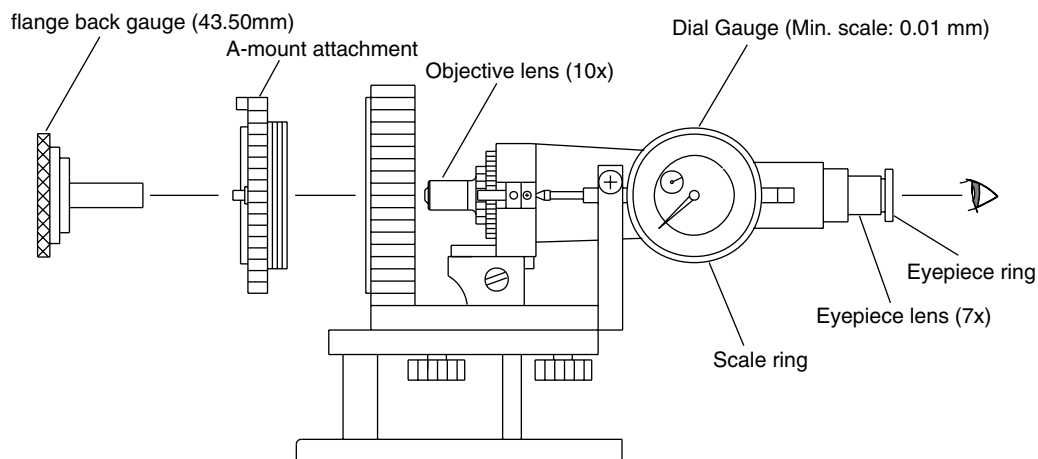


Fig.4-4-1

- 2) Looking through the eyepiece lens, turn the eyepiece ring of the flange back tester so that cross line or scale in the view is the sharpest.
- 3) Attach the flange back gauge (43.50mm) securely to the A-mount attachment and hold them together.
- 4) Turn the focusing knob of the flange back tester so that fine scratches on the flange back gauge (43.50mm) is the sharpest.

Note: Turn the knob in the direction of the arrow of Fig.4-4-2 for correct reading.

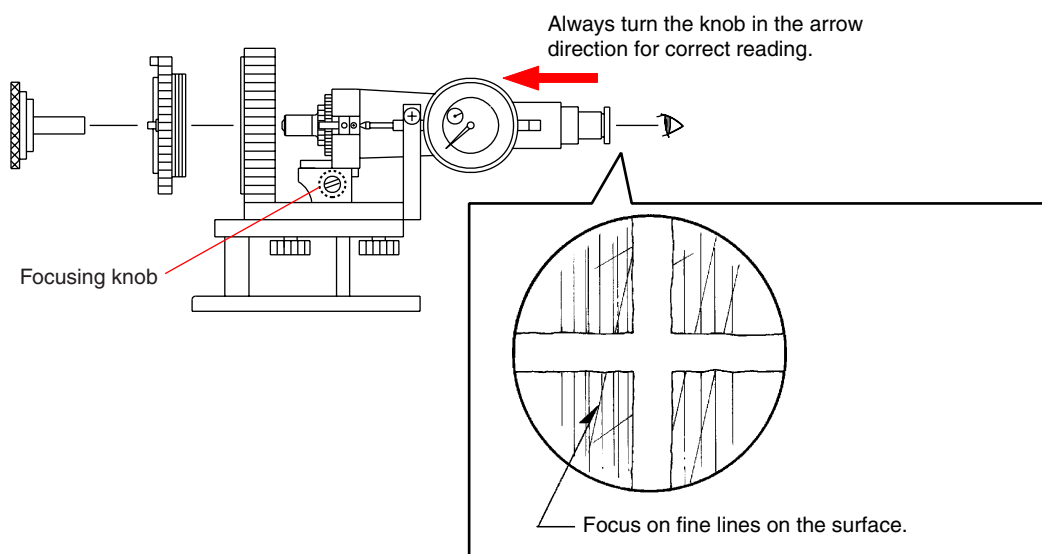


Fig.4-4-2

- 5) Turn the scale ring of the dial gauge until the long pointer indicates "0".

Note: This position is the flange back (f'F) = 43.5 mm.

Memorize the position of short-pointer.

2. Checking Method

- 1) Attach the checking lens to the flange back tester, and set the 1000 mm collimator.

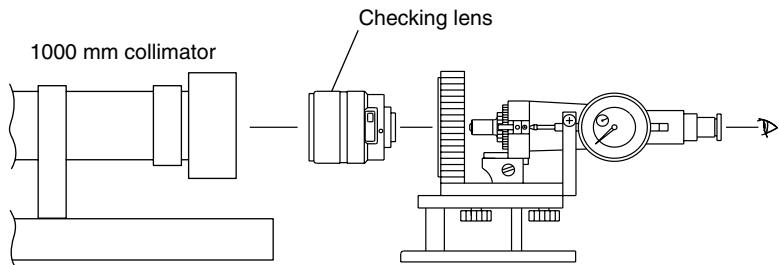


Fig.4-4-3

- 2) Set the distance tube of the checking lens to infinity end position while looking through the microscope, and align the optical axis to the center of the chart image accurately.
- 3) Turn the focusing knob of the tester until the chart image is the sharpest (red and green color areas are equal on the chart *).

*: Position in which the color of collimator chart changes from green into red and come into focus.

Also check the optical axis aligns with the chart center. (Refer to Fig.4-4-4.)

Note: Figure shows example. The cause depends on individual lens.

Optical Alignment
Best alignment

Incorrect aligned
e.g. As the focusing knob is turned, the chart may appear blurry as illustrated.
The cause depends on individual lens.

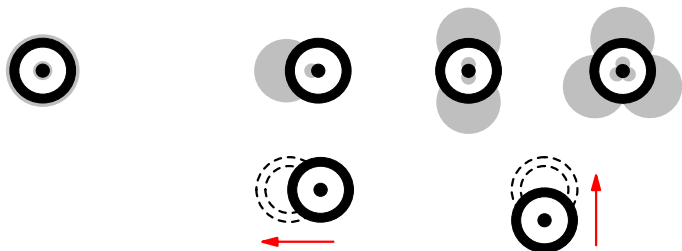


Fig.4-4-4

- 4) Calculate the flange back (f’F) of the checking lens using the following formula, and check that the specification of the Table 4-4-1 is satisfied.

$$\text{Flange back (f’F) of the checking lens} = (\text{Flange back gauge}) + (\text{Number of short-pointer revolution}) + (\text{Reading of long-pointer})$$

Specification

Focal-length f (mm)	f’F (mm) (Infinity position)
28	44.55 to 44.58

Table 4-4-1

- 5) When the flange back (f’F) of the checking lens is out of specification of the Table 4-4-1, perform “4-4-2. Flange Back (f’F) Adjustment”.

4-4-2. Flange Back (f'F) Adjustment

Equipment

- 1000 mm Collimator
- Flange Back Tester
- A-mount Attachment
- Flange Back Gauge (43.50mm)
- Adhesive bond (B-10)

Adjusting Method

- 1) Disassemble or assemble the checking lens into the state of Fig.4-4-5.

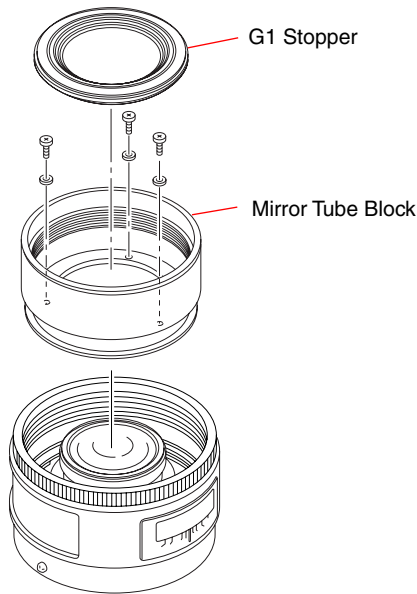


Fig.4-4-5

- 2) Perform “4-4-1. Flange Back (f'F) Check”, and check that the flange Back (f'F) of the checking lens is out of specification of the Table 4-4-1.

- 3) Turn the focusing knob of the tester until the flange back (f'F) of the checking lens is “44.56 mm”.

Note: When turning the focusing knob of the tester, chart image check is not required.

- 4) Turn the focus ring of the checking lens until red and green color areas are equal on the chart while looking through the microscope.

Note: If in-focus point cannot be obtained even through the focus ring is fully turned, perform the following steps (1) to (4) and shift the position of the focus ring. (Refer to Fig.4-4-6.)

- (1) Set the focusing ring to the infinity stop position, and hold the focus ring.
- (2) Loosen the six screws fixing the focus ring fastening plate.
- (3) Turn the helicoid in the direction of the arrow (screw in direction), and tighten the six screws loosened in step (2) tentatively.
- (4) Perform the step 4) again.

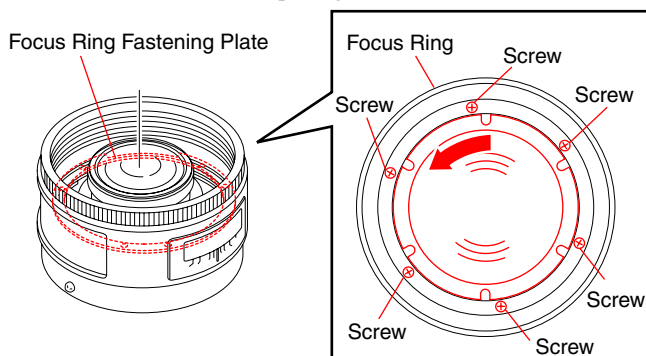


Fig.4-4-6

- 5) Loosen the three screws fixing the focus ring holding plate, and set the focus ring to the infinity stop position without moving the helicoid. (Refer to Fig.4-4-7.)
- 6) Tighten the six screws applying the adhesive bond (B-10) to the tip of screws.

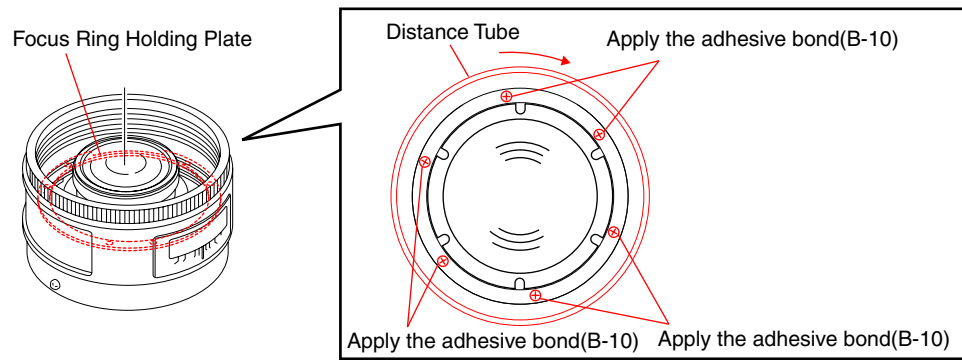


Fig.4-4-7

- 7) Check that the focus ring moves smoothly from minimum distance to infinity, and perform “4-4-1. Flange Back (f’F) Check” again.

4-5. LENS ROM CHECK

Note: If dialog box of error code appears during the checking, check the reason of error referring to page 4-17.

Equipment

- Personal Computer (PC)
- Camera DSLR-A100
- USB Cord With Connector
- Lens Adjustment Program

Note: Lens Adjustment Program is downloadable from the ESI homepage.

1. Preparations

- 1) Connect the checking lens to the camera.
- 2) Start the lens adjustment program “LensAdjustment.exe” referring to “4-1-2. Lens Adjustment Program”.

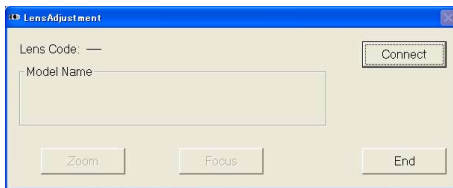


Fig. 4-5-1

2. Checking Method

- 1) Click the **Connect** button on the lens adjustment program.

Note: Click the **End** button to disconnect the USB connection, then lens adjustment program will terminate.

- 2) Check that the display of “Lens Code” and “Model Name” is correct.

Note: Focus position setting is not required.

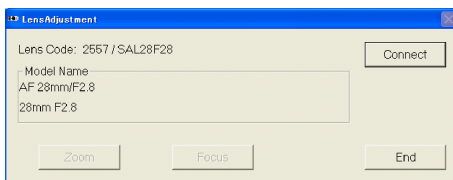


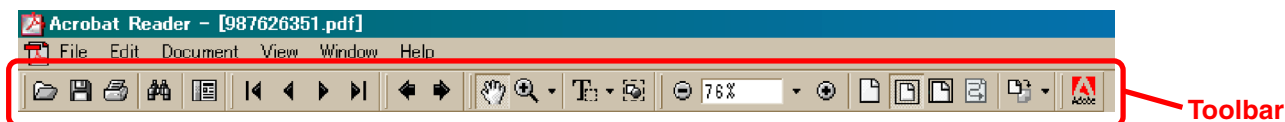
Fig. 4-5-2

- 3) Click the **End** button to terminate the lens adjustment program.
- 4) Turn the POWER switch of the camera to OFF.


4-6. ERROR CODE LIST

Error code		Description
Corrupt Data		Zoom/focus data of check pattern is out of sync with the number of check pattern.
Error, No Lens		Lens is not connected correctly.
Error, Unknown Lens		Unidentified lens is connected.
Communication Error,	Code#:E600	Communication error with the camera
	Code#:F000	Input data error to DLL file
	Code#:F100	Setting error of USB port
	Code#:2531	Communication error of main signal on the camera


[Description of main button functions on toolbar of the Adobe Acrobat Reader Ver5.0 (for Windows)]





Printing a text

1. Click the Print button .
2. Specify a printer, print range, number of copies, and other options, and then click [OK].

Application of printing:

To set a range to be printed within a page, select the graphic selection tool  and drag on the page to enclose a range to be printed, and then click the Print button.


Reversing the screens displayed once

- To reverse the previous screens (operation) one by one, click the .
- To advance the reversed screens (operation) one by one, click the .

Application to the Service Manual:

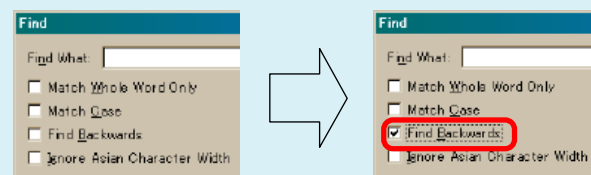
This function allows you to go and back between circuit diagram and printed circuit board diagram, and accordingly it will be convenient for the voltage check.

Finding a text

1. Click the Find button .
2. Enter a character string to be found into a text box, and click the [Find]. (Specify the find options as necessary)

Application to the Service Manual:

To execute "find" from current page toward the previous pages, select the check box "Find Backwards" and then click the "Find".








3. Open the find dialog box again, and click the [Find Again] and you can find the matched character strings displayed next. (Character strings entered previously are displayed as they are in the text box.)

Application to the Service Manual:


The parts on the drawing pages (block diagrams, circuit diagrams, printed circuit boards) and parts list pages in a text can be found using this find function. For example, find a Ref. No. of IC on the block diagram, and click the [Find Again] continuously, so that you can move to the Ref. No. of IC on the circuit diagram or printed circuit board diagram successively.


Note: The find function may not be applied to the Service Manual depending on the date of issue.

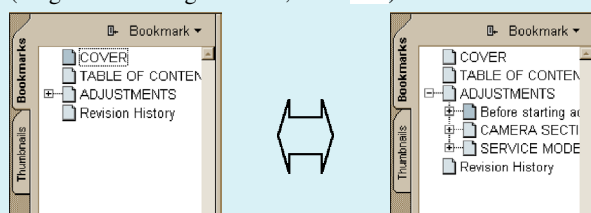
Moving with link

1. Select either palm tool , zoom tool , text selection tool , or graphic selection tool .
2. Place the pointer in the position in a text where the link exists (such as a button on cover and the table of contents page, or blue characters on the removal flowchart page or drawing page), and the pointer will change to the forefinger form .
3. Then, click the link. (You will go to the link destination.)

Moving with bookmark:



Click an item (text) on the bookmark pallet. and you can move to the link destination. Also, clicking  can display the hidden items.

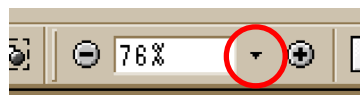
(To go back to original state, click )




Zooming or rotating the screen display

"Zoom in/out"

- Click the triangle button in the zoom control box to select the display magnification. Or, you may click  or  for zooming in or out.







"Rotate"

- Click rotate tool , and the page then rotates 90 degrees each.

Application to the Service Manual:

The printed circuit board diagram you see now can be changed to the same direction as the set.

Switching a page

- To move to the first page, click the .
- To move to the last page, click the .
- To move to the previous page, click the .
- To move to the next page, click the .

Revision History

Ver.	Date	History	Contents	S.M. Rev. issued
1.0	2006.08	Official Release	—	—
1.1	2007.01	Revised-1	<ul style="list-style-type: none"> Change of Repair Parts (Section 2, Section 3, Section 4) 	Yes