

# SAL20F28

(2.0/28) (20mm F2.8)

## SERVICE MANUAL

[Ver 1.2 2007.05](#)

[Revision History](#)

[How to use  
Acrobat Reader](#)



*US Model  
Canadian Model  
AEP Model  
Chinese Model*

### Link

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LENS FOR DSLR CAMERA

**SONY**<sup>®</sup>



## 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)

30

\*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

9-10

### Angle of view 1 \*1

94°

### Angle of view 2 \*1

70°

\*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

0.25 (0.8)

\*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)

72

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

Approx. 78 × 53.5 (3 1/16 × 2 1/8)

### Mass (g (oz.))

Approx. 285 (10 5/16)

### Included items

Lens (1), Front lens cap (1), Rear lens cap (1), Lens hood (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!!**

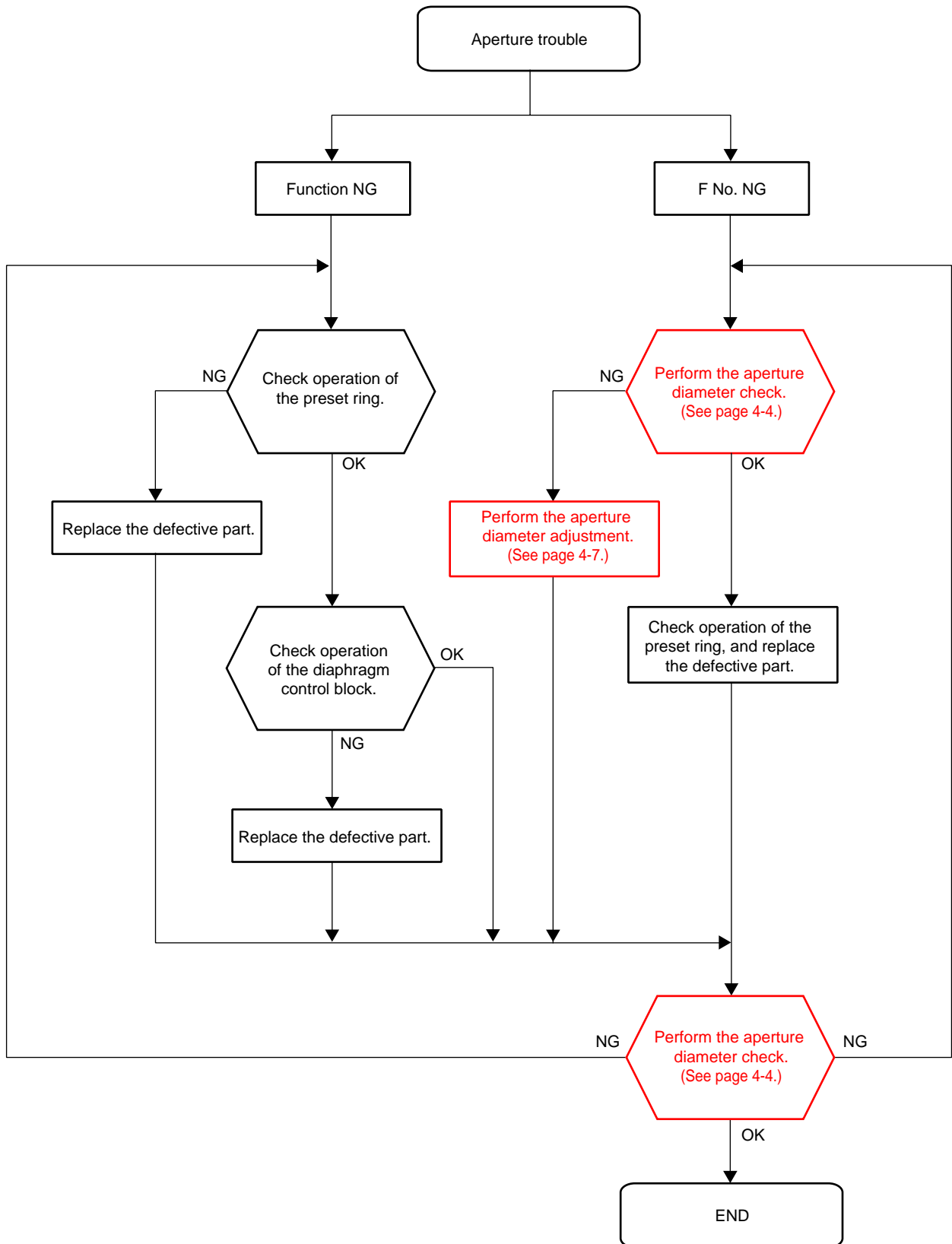
**COMPONENTS IDENTIFIED BY MARK  $\triangle$  OR DOTTED LINE WITH MARK  $\triangle$  ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.**

**ATTENTION AU COMPOSANT AYANT RAPPORT  
À LA SÉCURITÉ!**

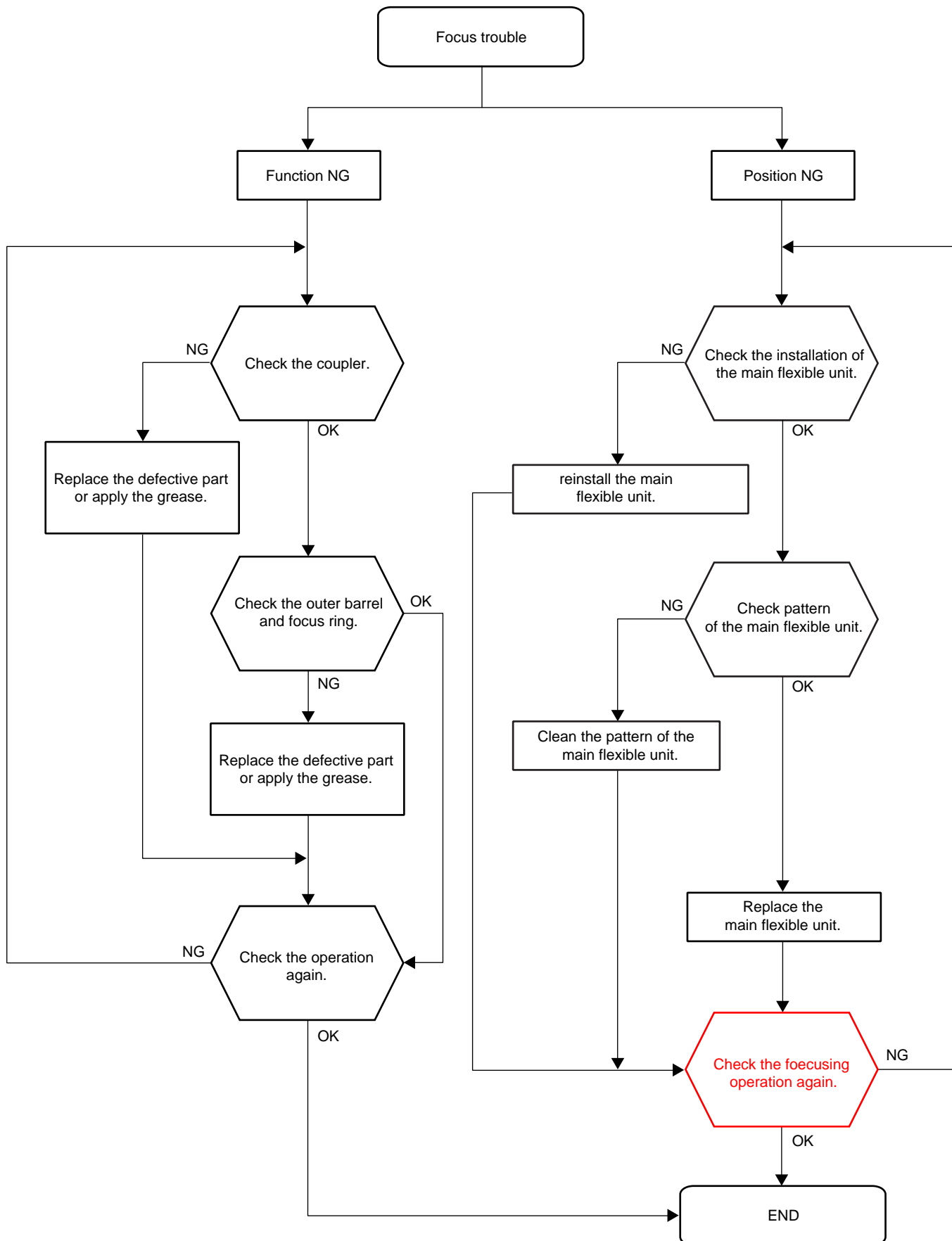
**LES COMPOSANTS IDENTIFÉS PAR UNE MARQUE  $\triangle$  SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.**

# 1-5. TROUBLESHOOTING

## 1-5-1. Aperture Trouble



## 1-5-2. Focus Trouble

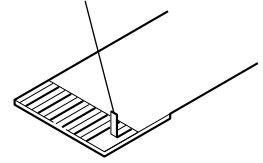


## 2. DISASSEMBLY

### 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)

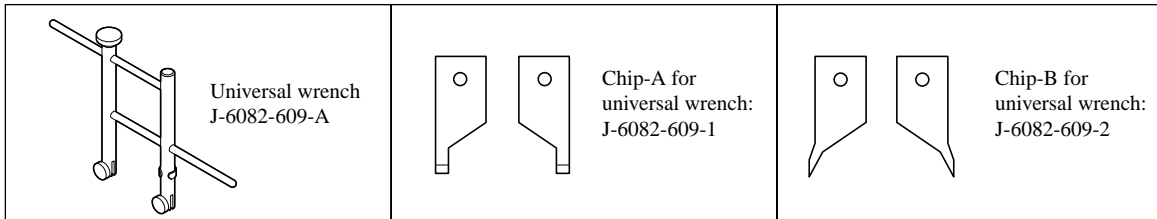


### UNIVERSAL WRENCH

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

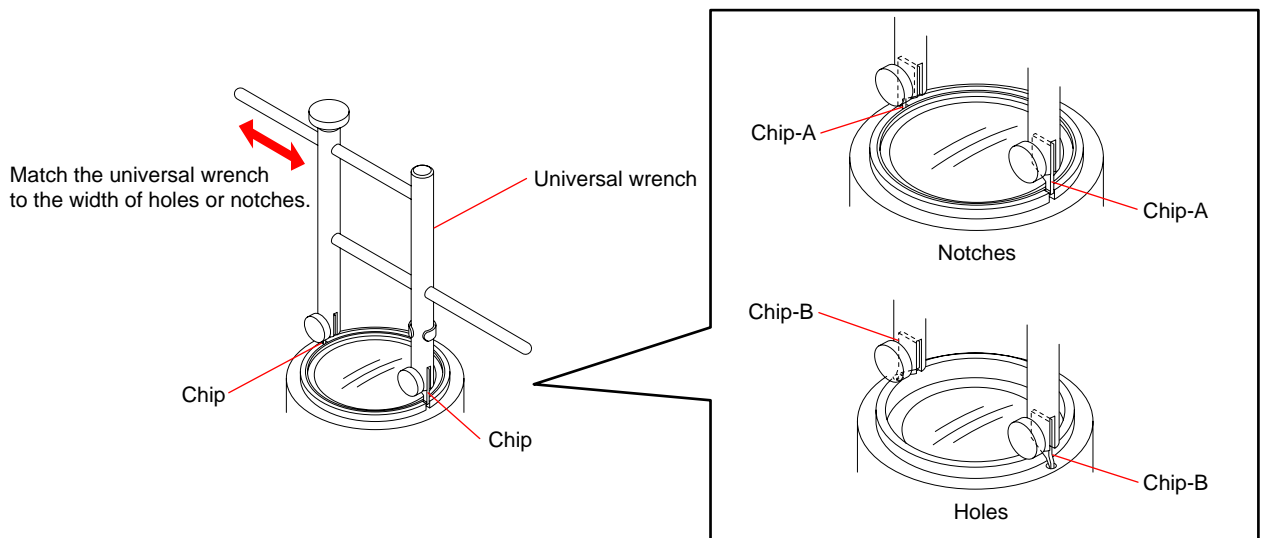


### How to Use



Attach the chip-A or chip-B to the universal wrench.  
For the notches: chip-A  
For the holes: chip-B

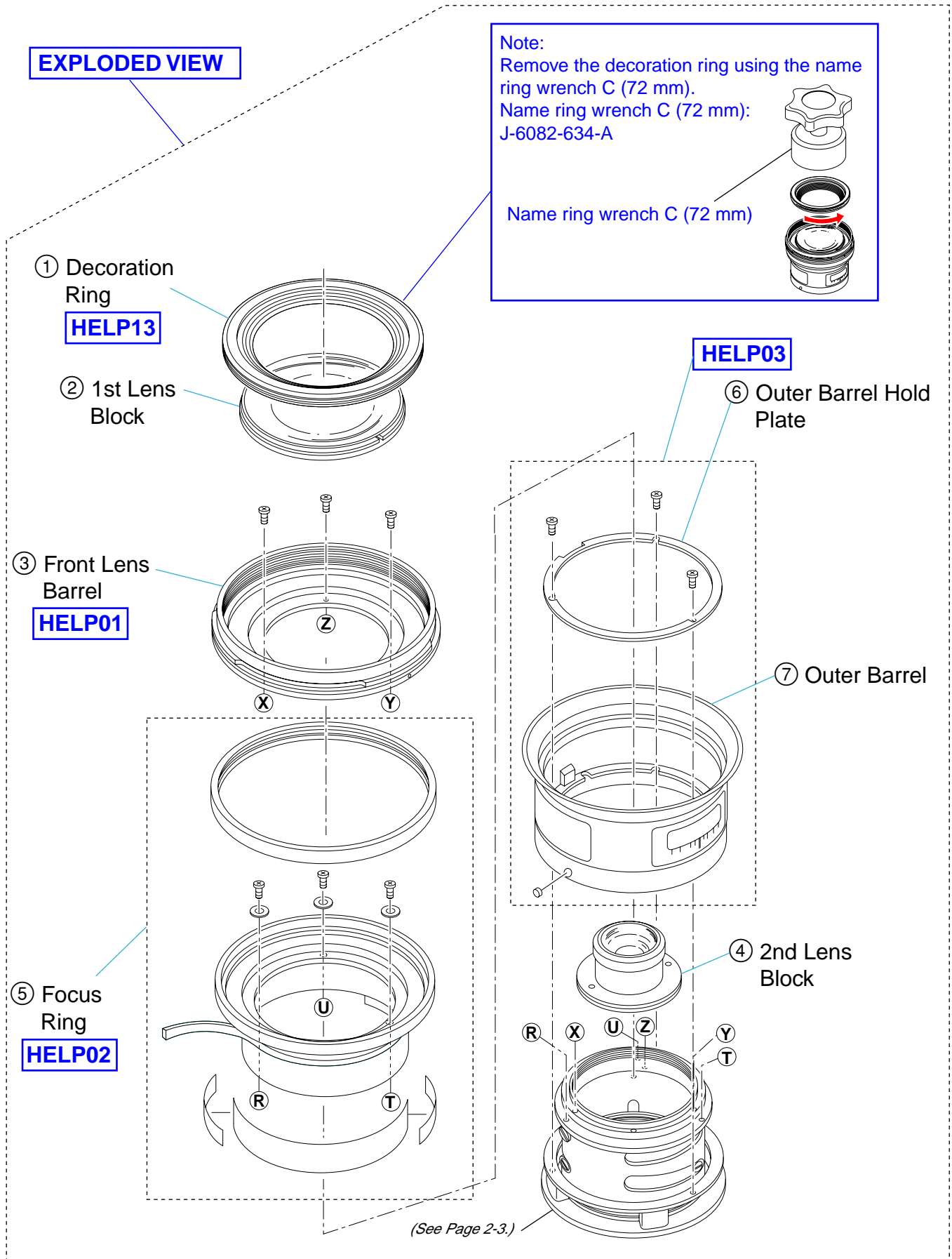
Match the universal wrench to the holes or notches of the lens block, etc.





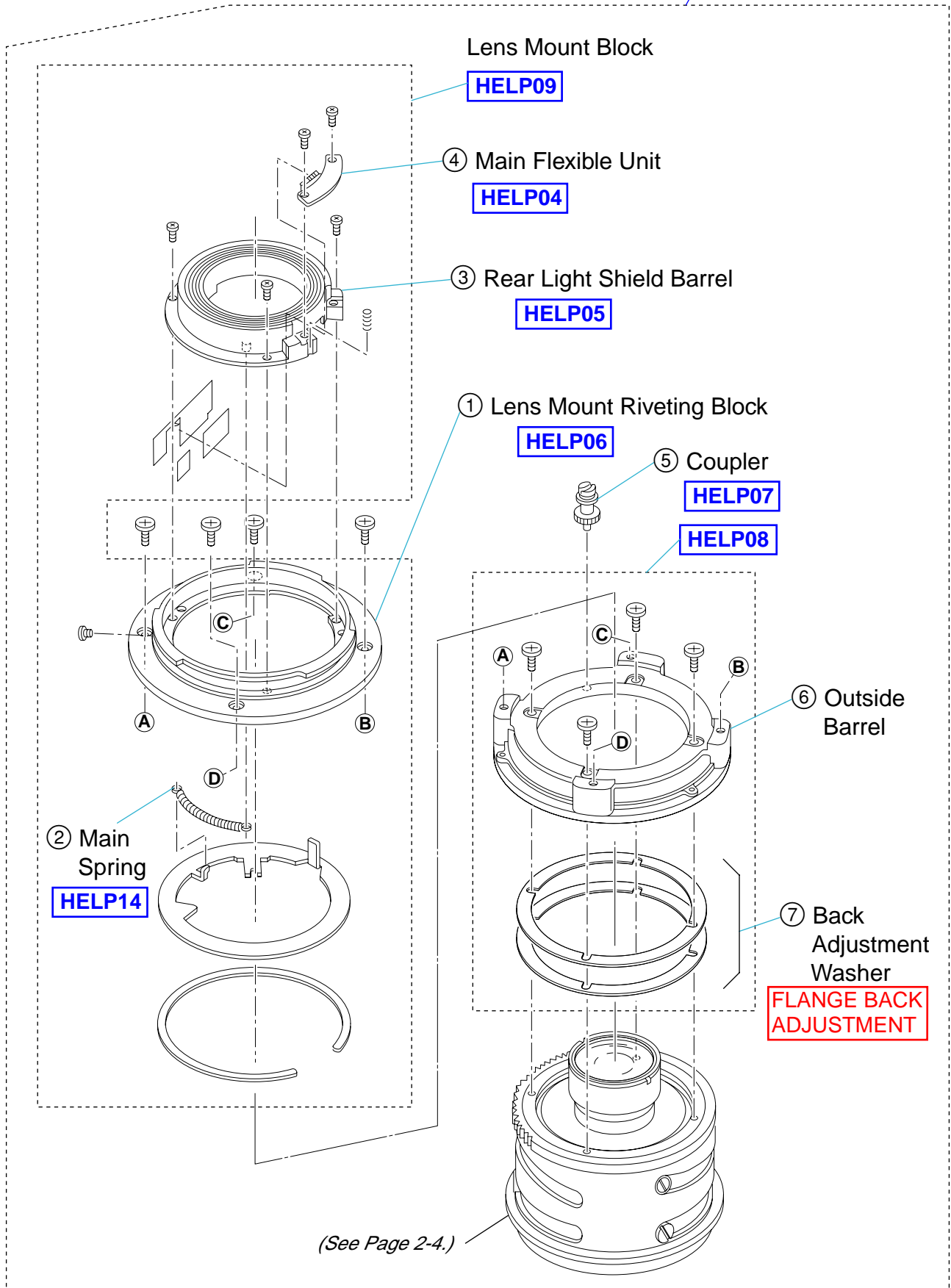
2-1. DISASSEMBLY

2-1-1. FOCUS RING, FRONT LENS BARREL AND FIXED TUBE

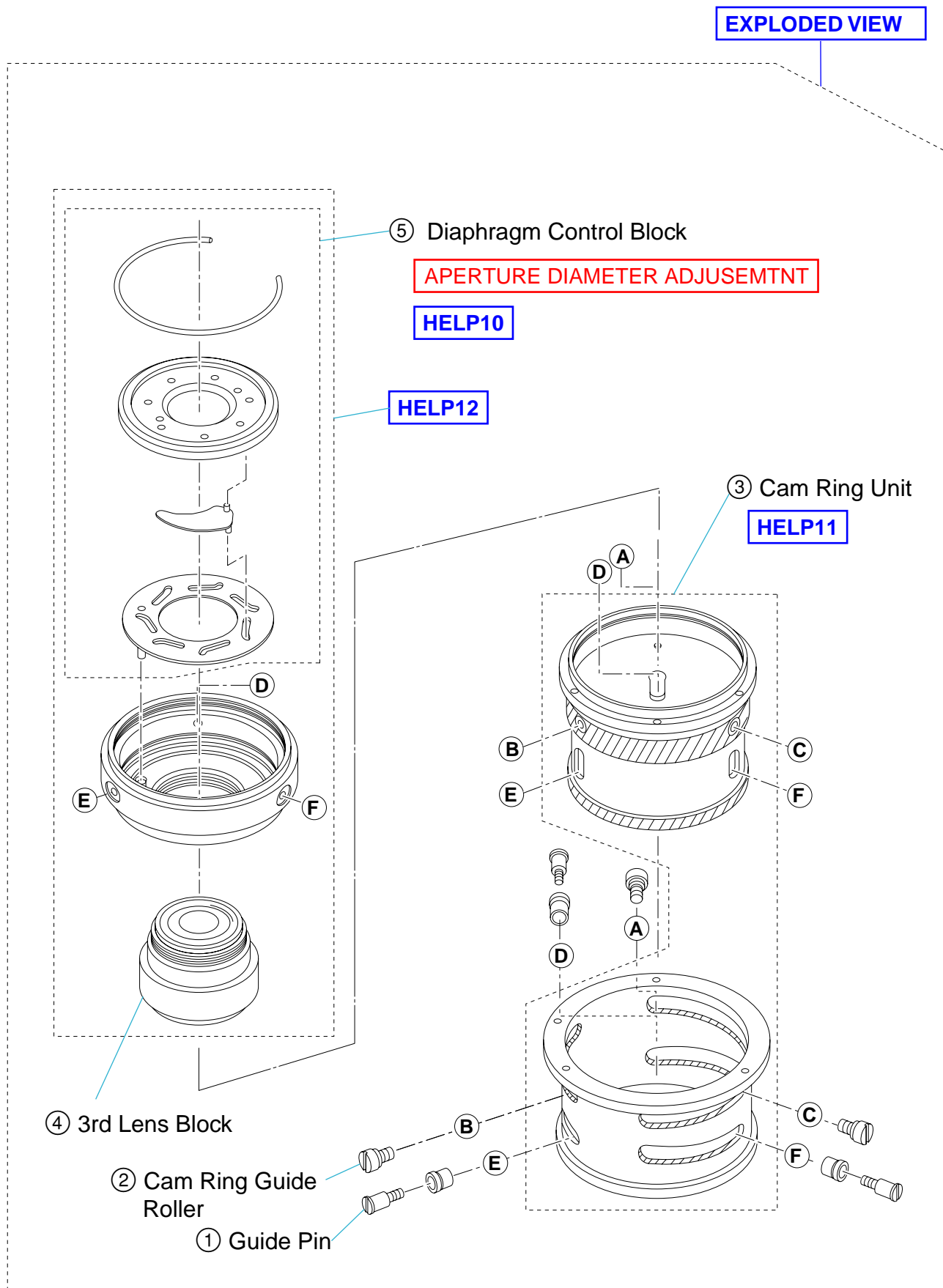


2-1-2. REAR LIGHT SHIELD BARREL, LENS MOUNT BLOCK AND OUTSIDE BARREL

EXPLODED VIEW



2-1-3. CAM RING UNIT AND INNER TUBE



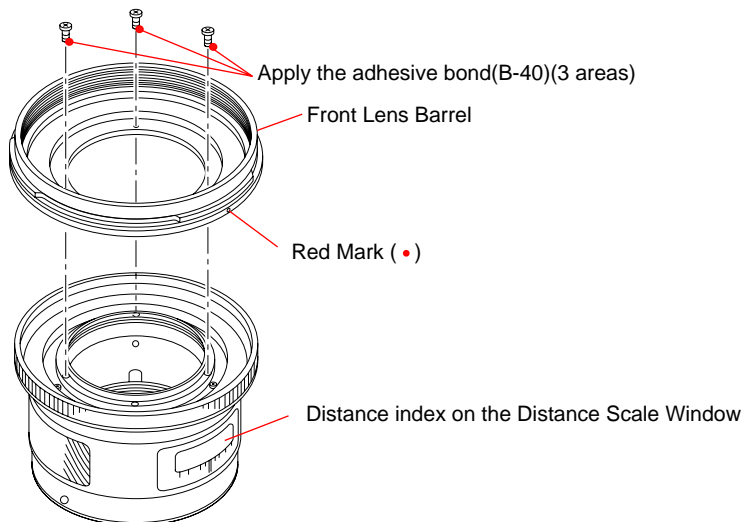
# HELP

Note for assembling and grease applying positions are shown.

## HELP01

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

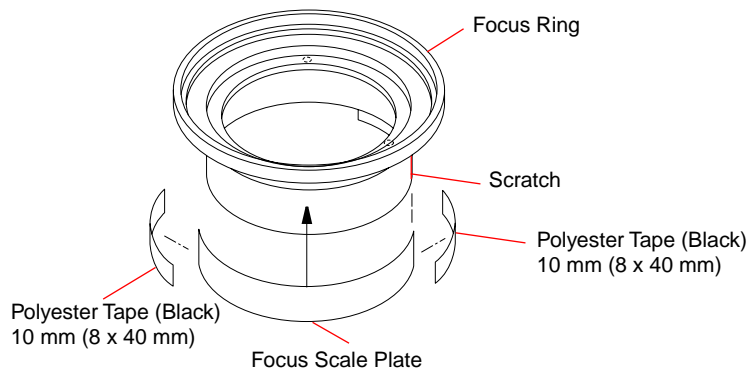
1. Align the red mark on the front lens barrel with the distance index on the distance scale window, fix the front ring with the three screws tentatively as shown in the figure.
2. Attach the 1st lens block.
3. Perform the “4-2-1. Aperture Diameter Check”.
4. After the aperture diameter check is completed, remove the 1 group lens block tentatively. Apply the adhesive bond (B-40) to the three screws and tighten them as shown in the figure.



**HELP02**

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

1. Affix both ends of focus scale plate with tapes, aligning the end ( $\infty$  side) of focus scale plate with the marking on focus ring.

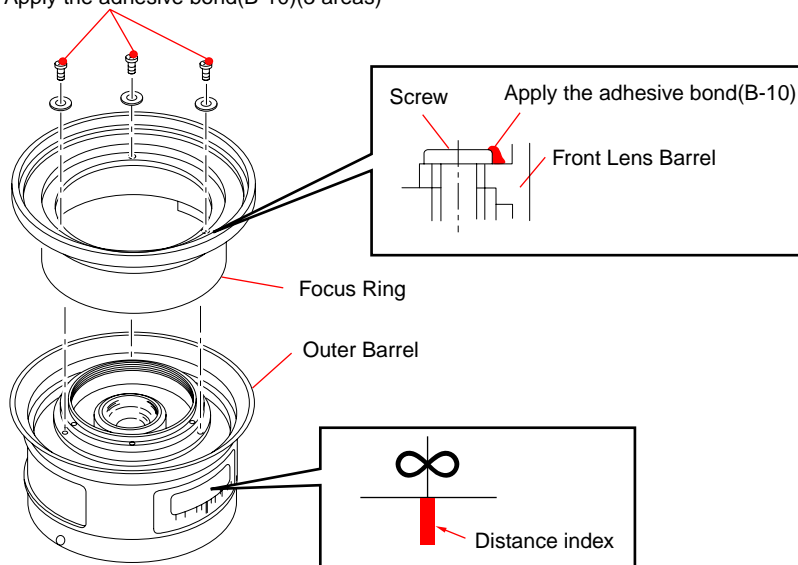


2. Attach the focus ring to the outer barrel and align the “center of infinity” of focus scale plate with the guide mark of focus scale window unit.

**Note:** Be sure to turn the focus ring clockwise when aligning.

3. Tighten the three screws as shown in the figure, and apply the adhesive bond (B-10) to the screw head as shown in the figure.

Apply the adhesive bond(B-10)(3 areas)



## HELP03

Adhesive bond (LOCTITE 460) (Note)

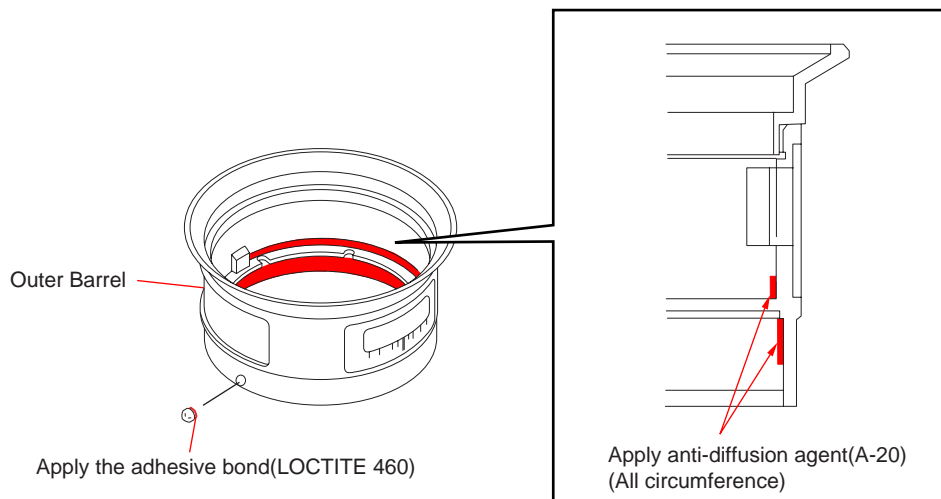
**Note:** Use adhesive bond (LOCTITE 460) or an equivalent article.

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

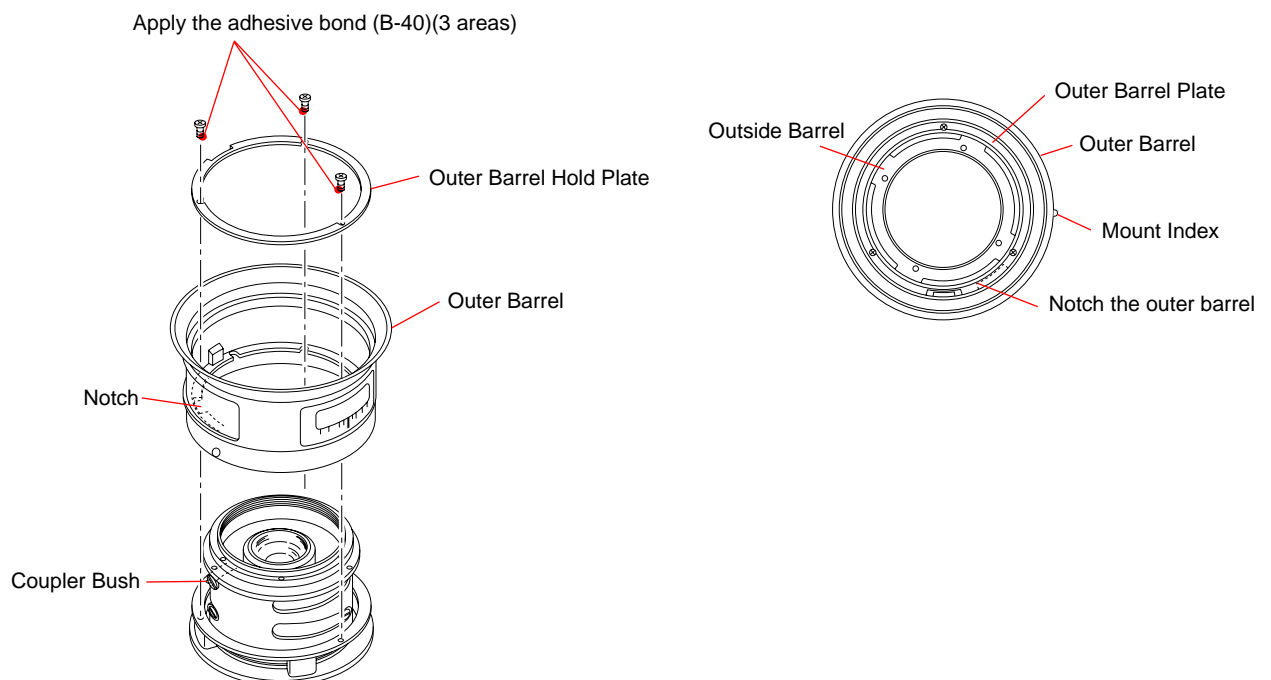
Anti-diffusion agent (A-20): J-6082-611-A

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

1. Apply the adhesive bond ((LOCTITE 460) to the back side of the mount index, and attach it to the outer barrel.
2. Apply the anti-diffusion agent (A-20) to the instruction portions of the outer barrel.



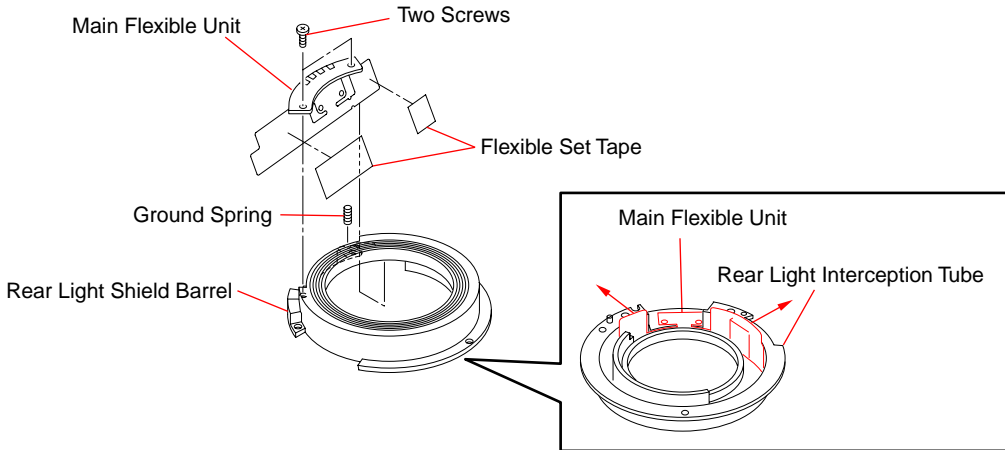
3. Attach the outer barrel and outer barrel hold plate as shown in the figure. Apply the adhesive bond (B-40) to the three screws and tighten them as shown in the figure.



## HELP04

1. Attach the main flexible unit to the rear light interception 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 interception tube, fix with the flexible set tape in the arrow direction.

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



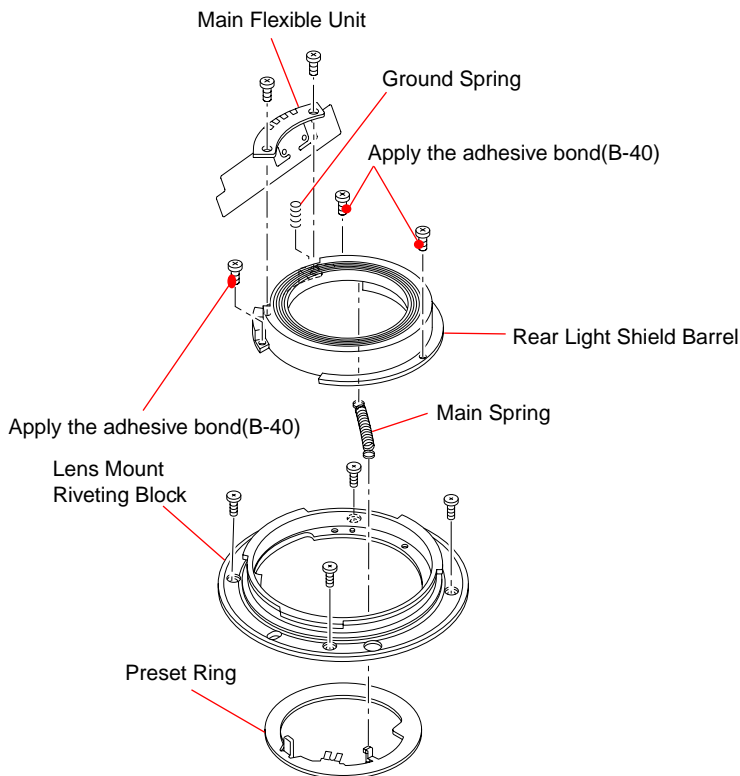
## HELP05

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

1. Hook the main spring to the hook of rear light shield barrel and the hook of preset ring.
2. Install the rear light shield barrel to the lens mount riveting block, apply the adhesive bond (B-40) to the screwed portions of screws, and tighten screws.
3. Install the ground spring to the rear light barrel and then the signal board.

**Note:** Be careful not to tighten screws too strongly.

Confirm that the preset ring moves smoothly.



## HELP06

Adhesive bond (LOCTITE 460) (Note)

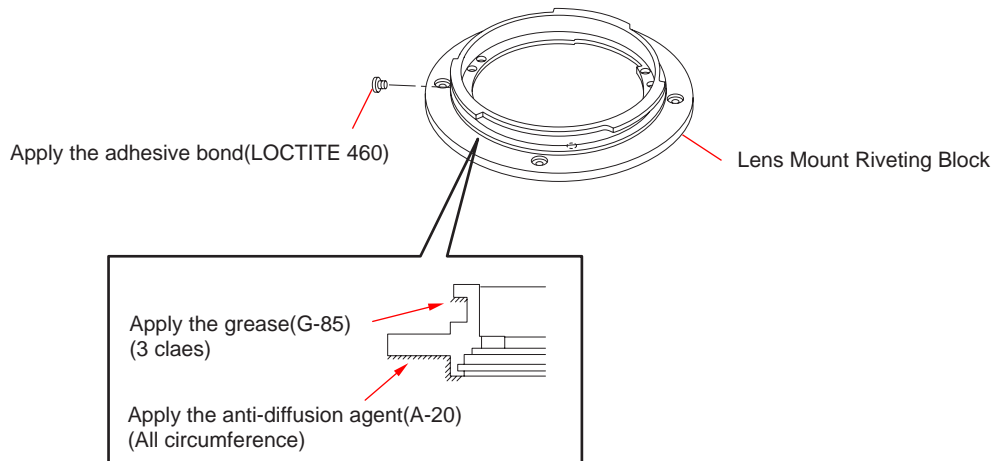
**Note:** Use adhesive bond (LOCTITE 460) or an equivalent article.

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 riveting block.
2. Apply the anti-diffusion agent (A-20) and grease (G-85) to the instruction portions of the lens mount riveting block.



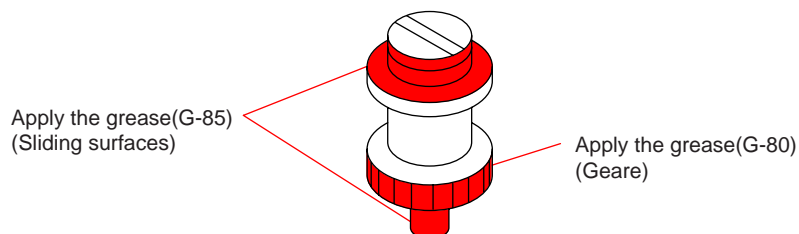
3. Attach the lens mount riveting block, and check the operation of the aperture blade.  
Turn the cam ring unit, and check the movement of the coupler.

## HELP07

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

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

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





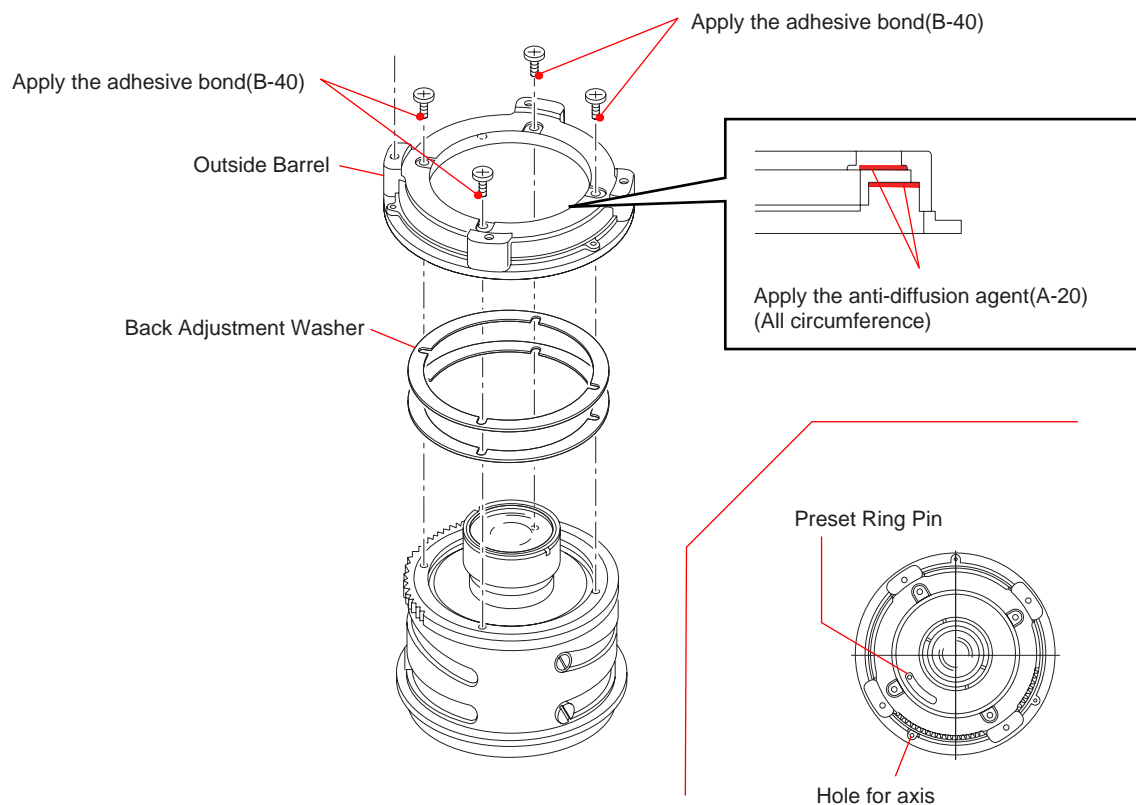
**HELP08**

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

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

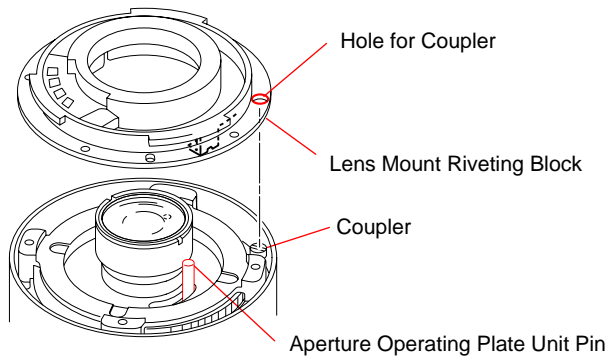
1. Apply the anti-diffusion agent (A-20) to the instruction portions of the outside barrel.
2. Install the back adjustment washers.
3. Attach the outside barrel so that the relationship of the preset ring pin and the hole for axis meet the position as shown in the figure.
4. Turn the outside barrel clockwise, eliminating play, and tighten four screws.

**Note:** After performing “4-4-2 Flange back (f’F) adjustment”, apply the adhesive bond (B-40) to the screwed portions of screws and tighten screws.

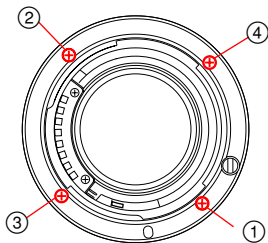


## HELP09

1. Turn the iris control plate unit pin counterclockwise to close the diaphragm.
2. Align the notch of the preset ring to the aperture operating plate unit pin, the hole for coupler to the coupler, and attach the lens mount riveting block.



3. Turn the lens mount riveting block counterclockwise, eliminating play, and tighten four screws in order as shown in figure.



## HELP10

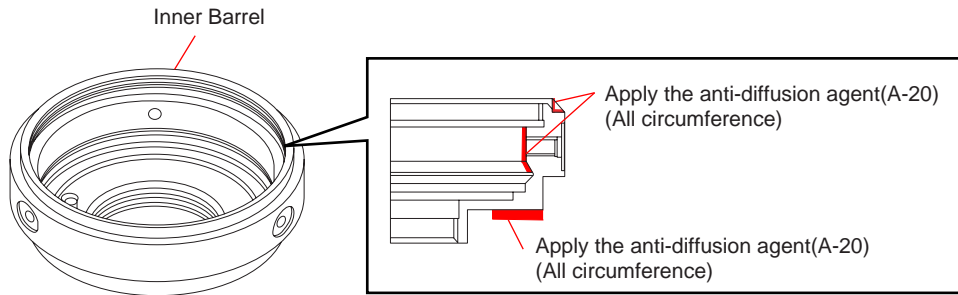
Adhesive bond (B-10): J-6082-612-A

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

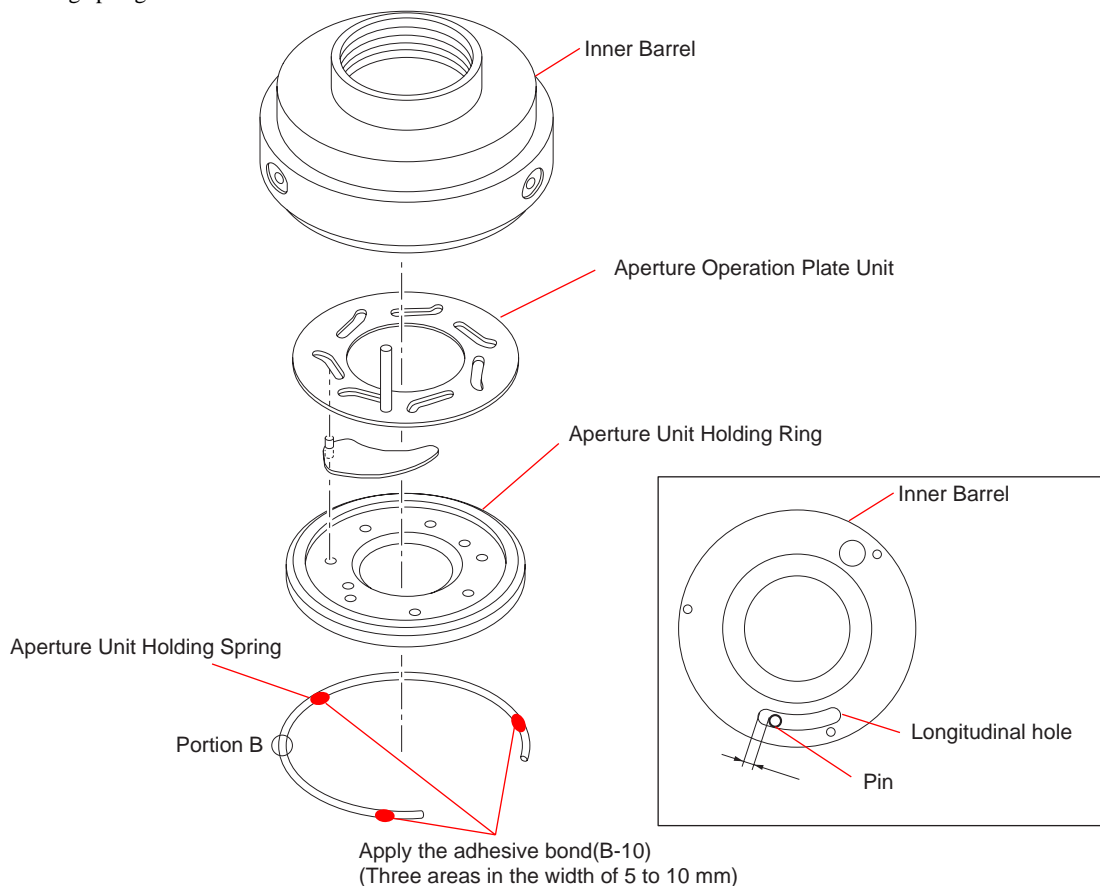
1. Attach the seven aperture blade unit to the aperture unit holding ring.

**Note:** Attach the aperture blade unit in fully opening state.

2. Attach the aperture blade unit.
3. Apply anti-diffusion agent (A-20) to the instruction portions of the inner barrel.



4. Attach the inner barrel to the aperture blade unit assembled in step 2 while fitting the pin of the aperture operation plate unit to the longitudinal hole.
5. Place the inner tube block assembled in step 4 up side down.
6. Move the aperture blade unit so that the clearance between the pin of the aperture operation plate unit and the edge of the longitudinal hole of the inner barrel may become around 1 mm.
7. Attach the aperture unit holding spring, and check the operation of the aperture blade.  
**Note:** When attaching the aperture unit holding spring, insert the portion B first.
8. After the aperture diameter adjustment is completed, apply adhesive bond (B-10) to the instruction portions of the aperture unit holding spring.



SAL20F28 (2.0/28) (20mm F2.8)

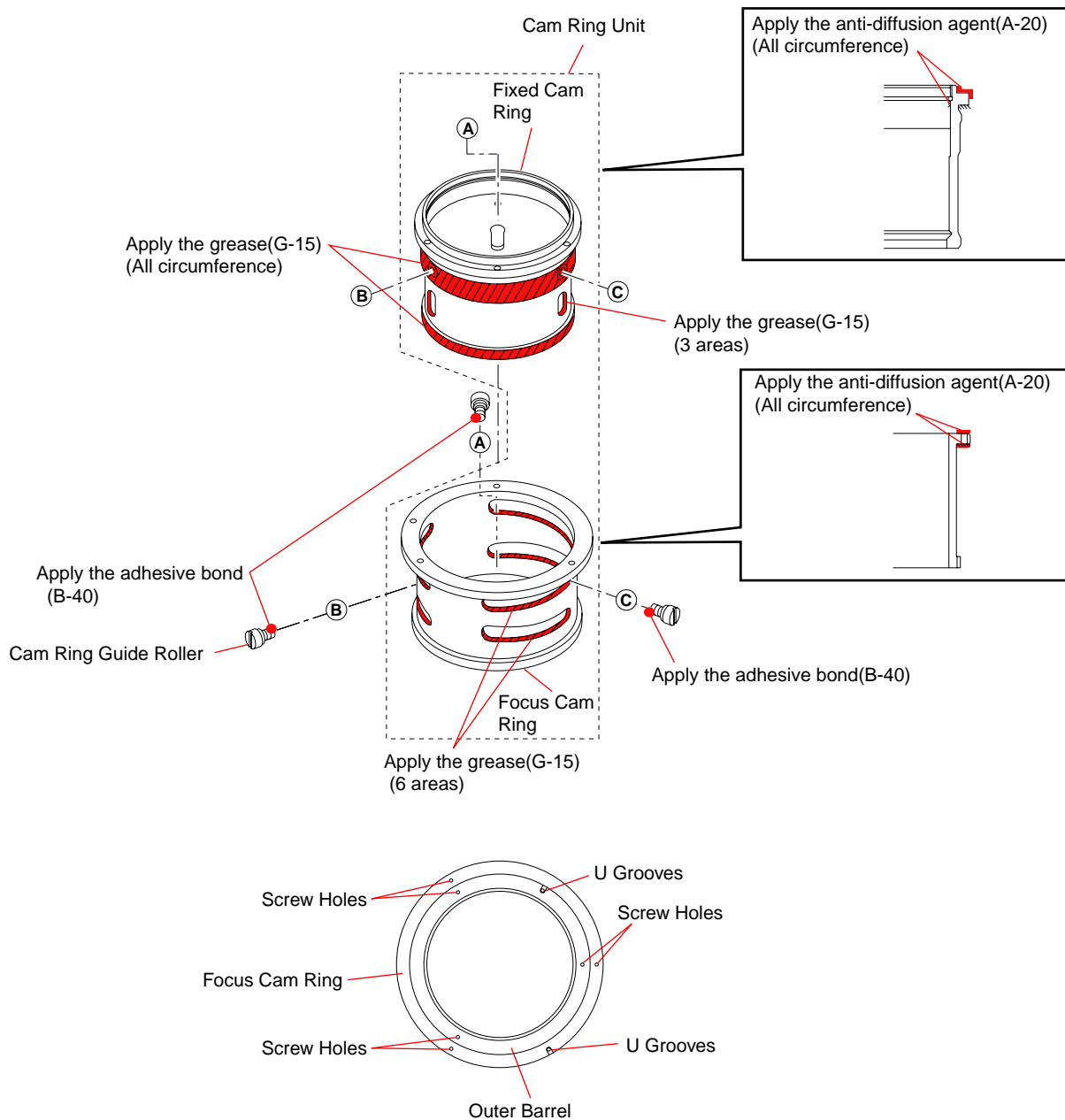
## HELP11

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

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

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

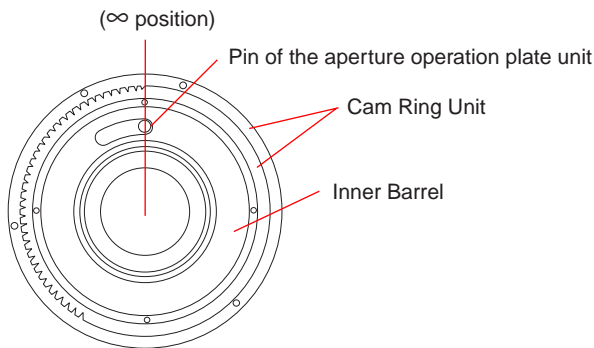
1. Apply the anti-diffusion agent (A-20) and the grease (G-15) to the instruction portions of the fixed cam ring.
2. Apply the anti-diffusion agent (A-20) and the grease (G-15) to the instruction portions of the focus cam ring.
3. Install the fixed cam ring to the focus cam ring.
4. Select the cam tube guide roller suitable for the width of the groove on the focus cam ring. Apply the adhesive bond (B-40) to the cam ring guide roller. (Tighten the three cam tube guide rollers into three places.)
5. Check that the fixed cam ring moves smoothly.



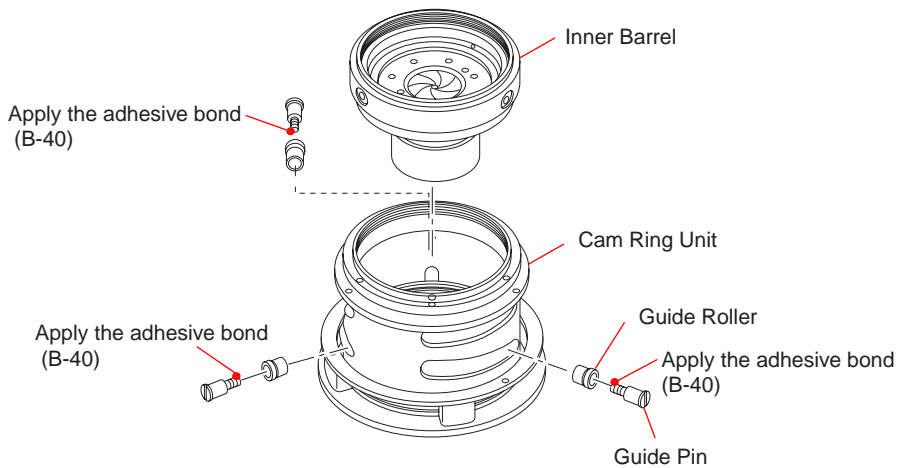
## HELP12

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

1. Install the inner tube block to the cam ring unit set so that the relationship between them meets the position as shown in the figure.



2. Select the guide roller suitable for the width of the groove on the cam ring unit. Apply the adhesive bond (B-40) to the guide pin, and pass the selected guide roller through the guide pin, and then tighten it. (Tighten the three guide pins into three places.)

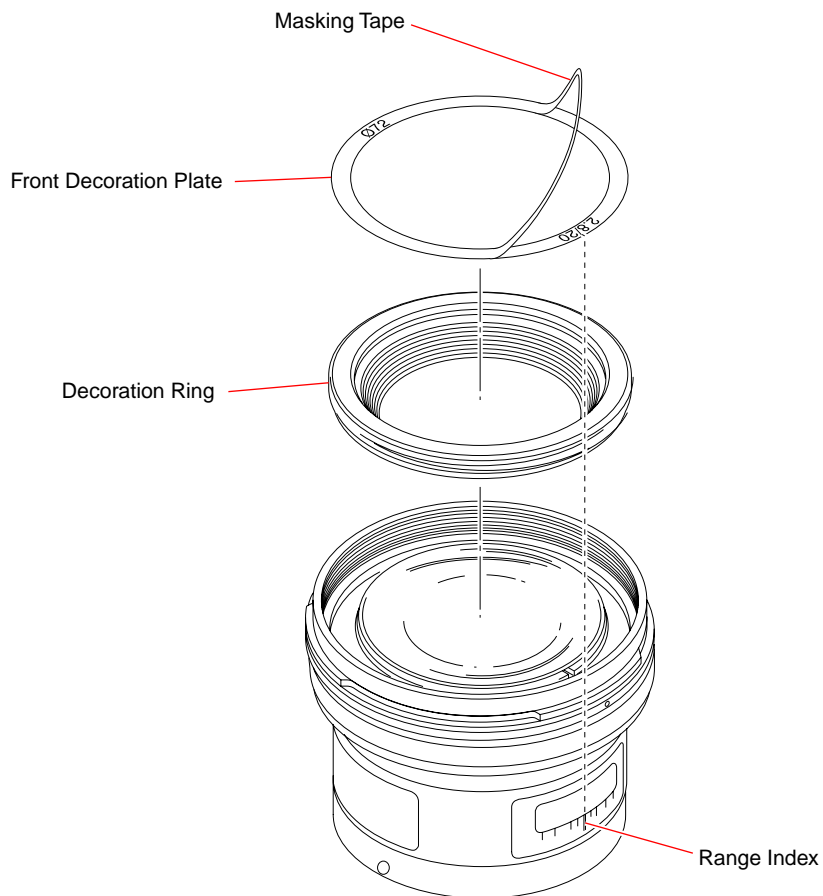


3. Check that the fixed cam ring rotates smoothly, and inner barrel moves smoothly.

**HELP13**

1. Align of “/” of “2.8/20” of the front ornamental plate with range index, and stick the front decoration plate onto the decoration ring.
2. Remove the masking tape of the front decoration plate.

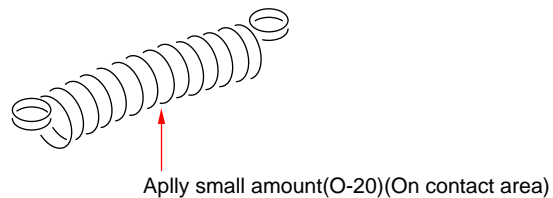
**Note:** Tolerance:  $\pm 2.5^\circ \approx \pm 1 \text{ mm}$



**HELP14**

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

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



### 3. REPAIR PARTS LIST

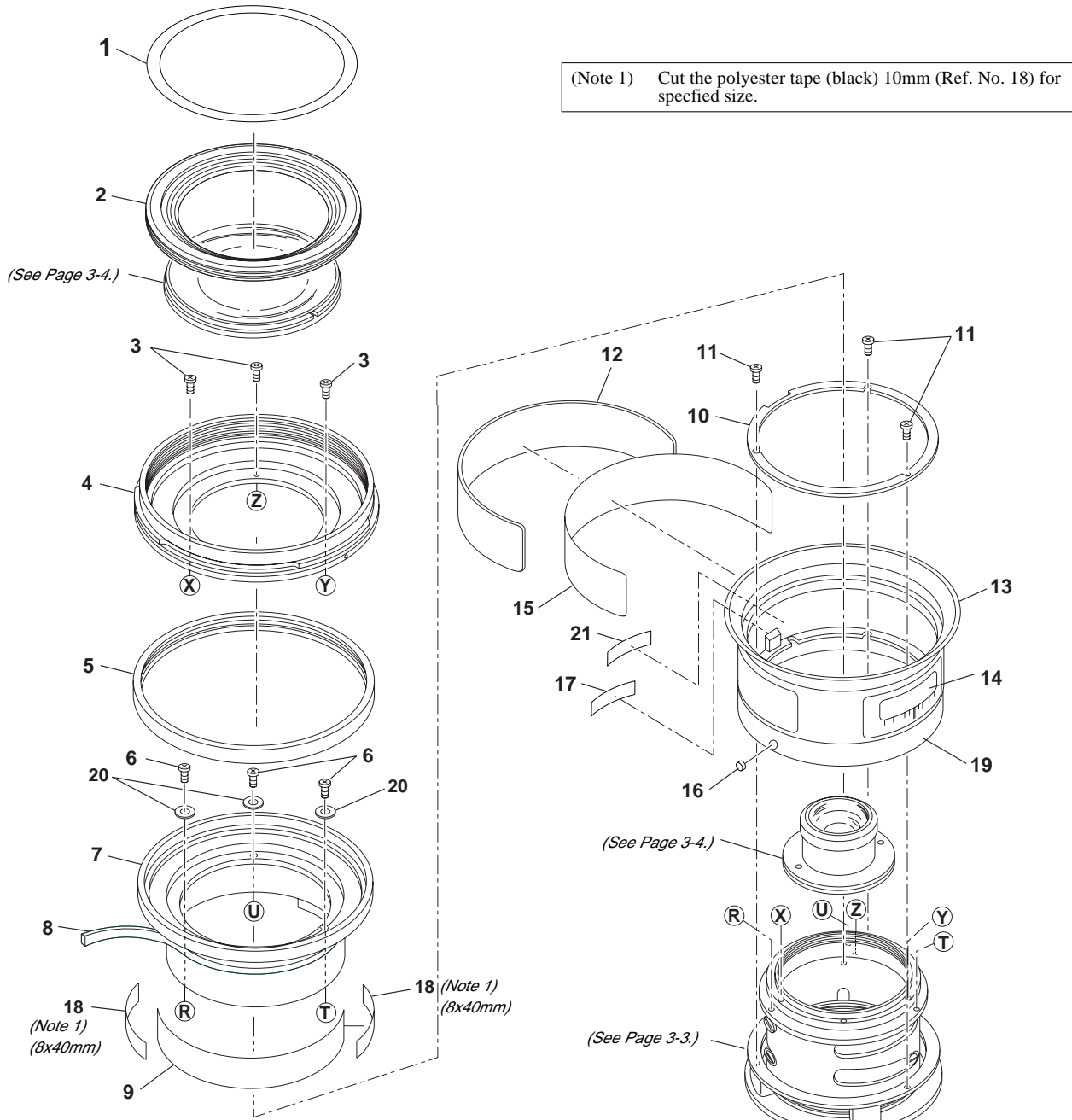
**DISASSEMBLY**

**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

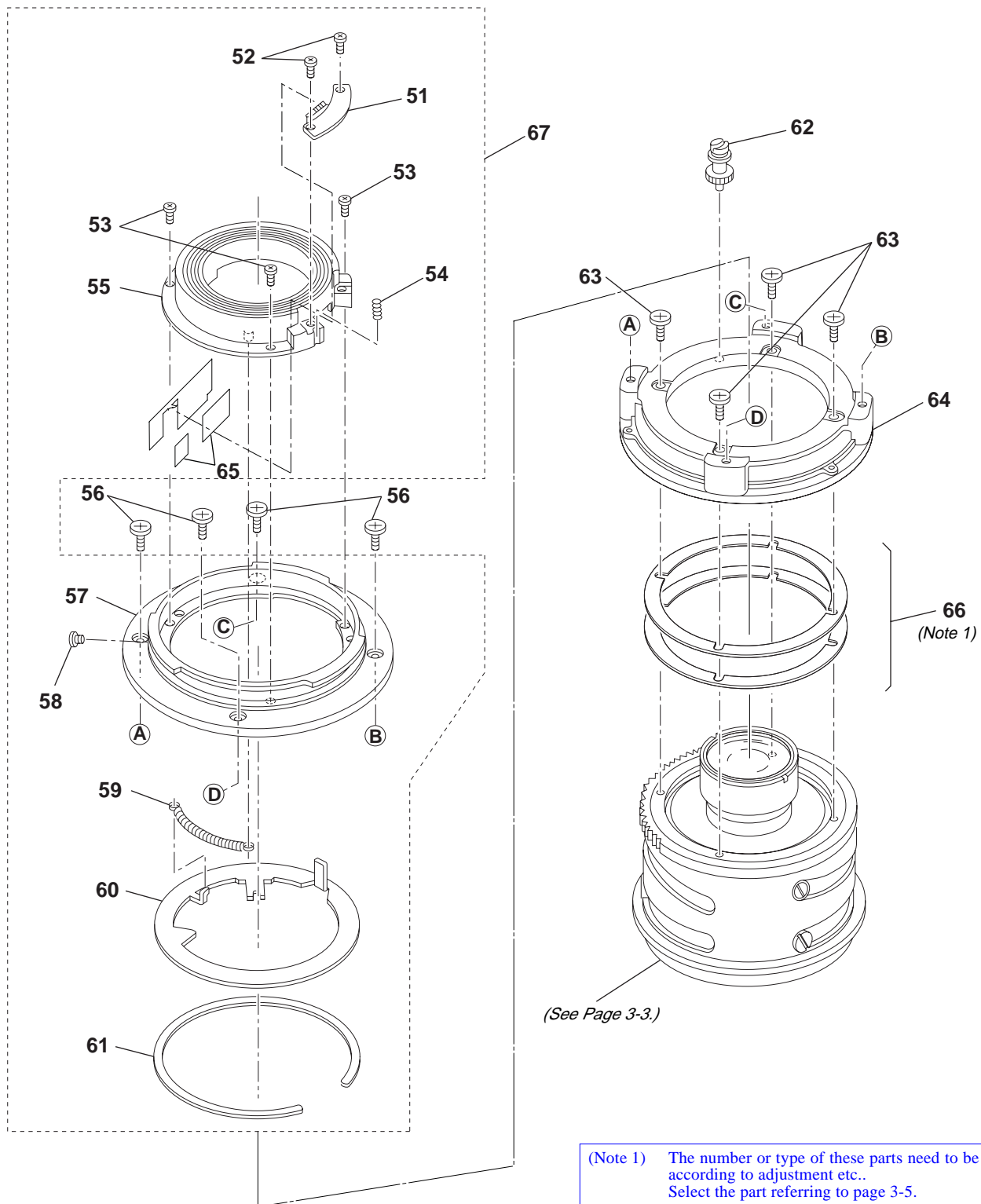
##### 3-1-1. FOCUS RING, FRONT LENS BARREL AND FIXED TUBE



Ref. No.	Part No.	Description
1	2-888-238-01	FRONT DECORATION PLATE
2	2-691-916-01	RING(DECORATION RING)
3	2-684-105-01	SCREW M1.6 X 3.5
4	2-691-914-01	FRONT LENS BARREL
5	2-691-905-01	FOCUS RING RUBBER RING
6	2-688-977-01	SCREW M1.6 X 3.0
7	2-691-903-01	RING (FOCUS RING)
8	2-691-957-01	FRICTION SHEET
9	2-691-917-01	PLATE (FOCUS SCALE PLATE)
10	2-691-955-01	OUTER BARREL HOLD PLATE

Ref. No.	Part No.	Description
11	2-684-117-01	SCREW M1.6 X 4.0
12	2-691-944-01	SHEET (HOLD SHEET)
13	2-691-915-01	RING (FIXED BARREL)
14	A-1197-609-A	UNIT(FOCUS SCALE WINDOW UNIT)
15	2-691-943-01	HOLD SHEET TAPE
16	2-683-692-01	CHIP (MOUNT INDEX)
17	2-684-073-01	LENS NO. PLATE
18	9-913-210-03	POLYESTER TAPE (BLACK) 10mm (Note 1)
19	2-691-913-01	RING(OUTER BARREL)
20	2-684-730-01	WASHER
21	2-695-851-01	LABEL, MODEL NAME

**3-1-2. REAR LIGHT SHIELD BARREL, LENS MOUNT BLOCK AND OUTSIDE BARREL**



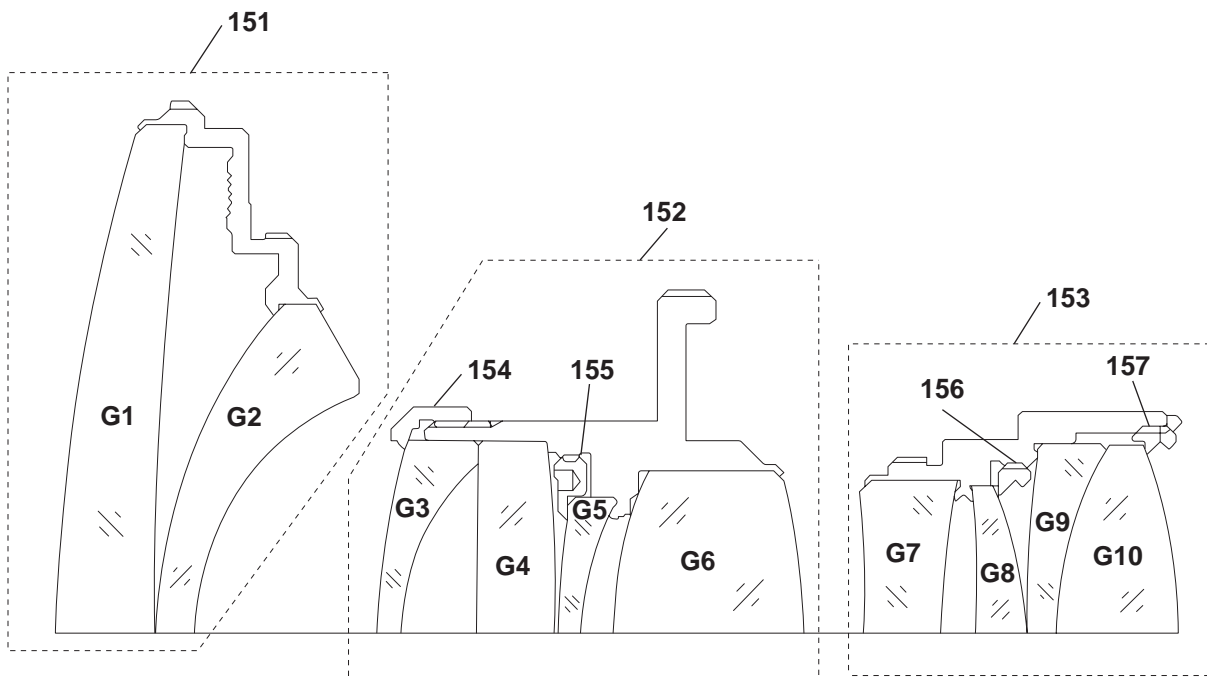
Ref. No.	Part No.	Description
51	A-1197-610-A	FLEXIBLE UNIT, MAIN
52	2-684-066-01	TAPPING SCREW 1.7 M1.7 X 4.0
53	2-684-064-01	SCREW M1.4 X 2.2
54	2-684-065-01	GROUND SPRING
55	2-691-904-01	TUBE (REAR LIGHT SHIELD BARREL)
56	2-687-685-01	SCREW M2.0 X 4.0
57	A-1212-861-A	BLOCK, LENS MOUNT RIVETING
58	2-684-244-01	STOPPER SCREW
59	2-691-960-01	MAIN SPRING

Ref. No.	Part No.	Description
60	2-691-959-01	RING (PRESET RING)
61	2-684-234-01	PRESET RING HOLDING PLATE
62	2-685-022-01	COUPLER
63	2-691-919-01	SCREW (SET SCREW A)
64	2-691-961-01	BARREL (OUTSIDE BARREL)
65	2-887-835-01	TAPE, FLEXIBLE SET
66	Selection parts	BACK ADJUSTMENT WASHER A to E (Note 1)
67	A-1206-555-A	BLOCK, LENS MOUNT





### 3-1-4. 1ST LENS BLOCK, 2ND LENS BLOCK AND 3RD LENS BLOCK



Ref. No.	Part No.	Description
151	A-1197-611-A	1ST LENS BLOCK
152	A-1202-190-A	2ND LENS BLOCK
153	A-1197-613-A	3RD LENS BLOCK
154	2-691-928-01	G3,4 STOPPER
155	2-691-929-01	G5 STOPPER
156	2-691-930-01	G8 STOPPER
157	2-691-931-01	G9,10 STOPPER

### 3-1-5. SELECTION PARTS

#### Ref. No.66

These washers are provided for flange back adjustment.  
Change the thickness (t) according to result of adjustment.

Part No.	Description
2-691-962-01	BACK ADJUSTMENT WASHER A (t=0.05)
2-691-963-01	BACK ADJUSTMENT WASHER B (t=0.07)
2-691-964-01	BACK ADJUSTMENT WASHER C (t=0.1)
2-691-965-01	BACK ADJUSTMENT WASHER D (t=0.2)
2-691-966-01	BACK ADJUSTMENT WASHER E (t=0.5)

#### Ref. No.108

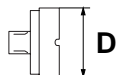
Select the type of part according to the operation load of the associated parts.



Part No.	Description
2-691-945-01	GUIDE ROLLER A (D1=5.03mm,D2=4.53mm)
2-691-946-01	GUIDE ROLLER B (D1=5.03mm,D2=4.52mm)
2-691-947-01	GUIDE ROLLER C (D1=5.03mm,D2=4.51mm)
2-691-948-01	GUIDE ROLLER D (D1=5.02mm,D2=4.53mm)
2-691-949-01	GUIDE ROLLER E (D1=5.02mm,D2=4.52mm)
2-691-950-01	GUIDE ROLLER F (D1=5.02mm,D2=4.51mm)
2-691-951-01	GUIDE ROLLER G (D1=5.01mm,D2=4.53mm)
2-691-952-01	GUIDE ROLLER H (D1=5.01mm,D2=4.52mm)
2-691-953-01	GUIDE ROLLER I (D1=5.01mm,D2=4.51mm)

#### Ref. No.109

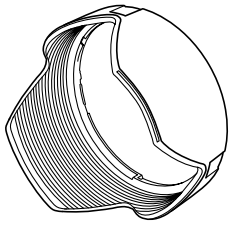
Select the type of part according to the operation load of the associated parts.



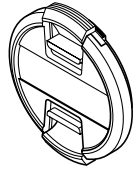
Part No.	Description
2-691-921-01	CAM RING GUIDE ROLLER A (D=5.01mm)
2-691-922-01	CAM RING GUIDE ROLLER B (D=5.02mm)
2-691-923-01	CAM RING GUIDE ROLLER C (D=5.03mm)
2-691-924-01	CAM RING GUIDE ROLLER D (D=4.99mm)
2-691-920-01	CAM RING GUIDE ROLLER E (D=5.00mm)

## 3-2. SUPPLIED ACCESSORIES

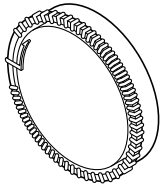
### Checking supplied accessories.



Lens Hood (SH0013)  
2-687-335-01



Front Lens Cap  
2-687-234-01



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) (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) (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.


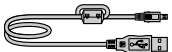
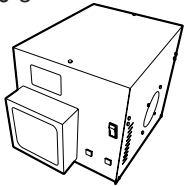

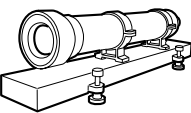
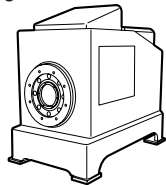
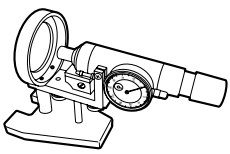
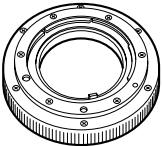
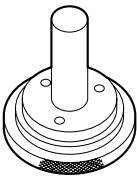
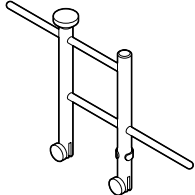
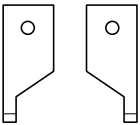
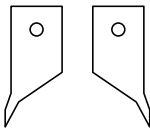
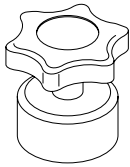
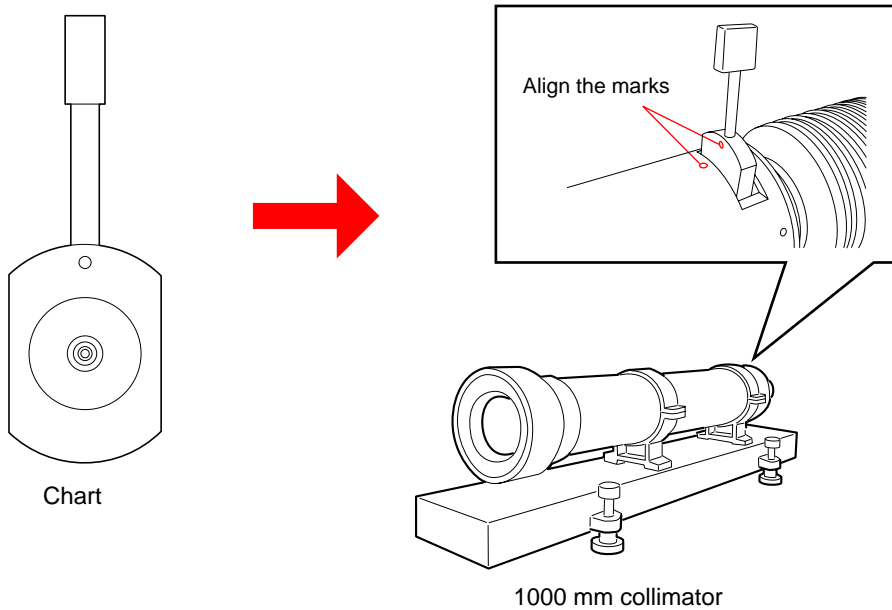
<p>J-1</p>  <p>Personal computer (Note 1)</p>	<p>J-2</p>  <p>USB cord with connector 1-833-062-11</p>	<p>J-3</p>  <p>Luminance box J-6082-581-A</p>
<p>J-4</p>  <p>AE master lens J-6082-597-A</p>	<p>J-5</p>  <p>1000 mm Collimator 110V: J-6082-604-A 240V: J-6082-604-B (Note 2)</p>	<p>J-6</p>  <p>Lens test 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>
<p>J-13</p>  <p>Name ring wrench C (72mm) J-6082-634-A</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 decoration ring was removed), or completion of assembling.

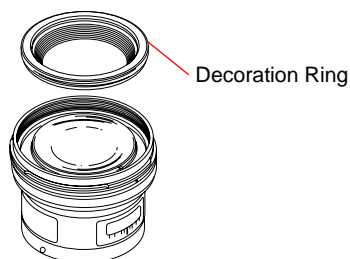


Fig.4-2-1

#### 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.

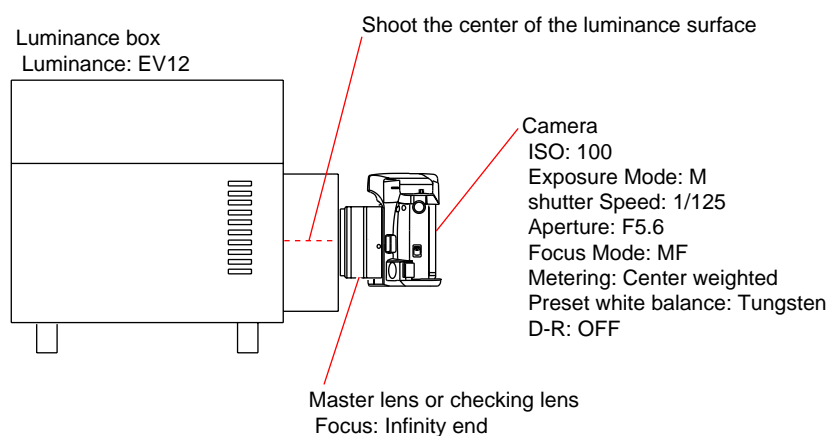


Fig.4-2-2

- 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: EV12

#### Setting of Lens:

Focus: Infinity end

#### Setting of Camera:

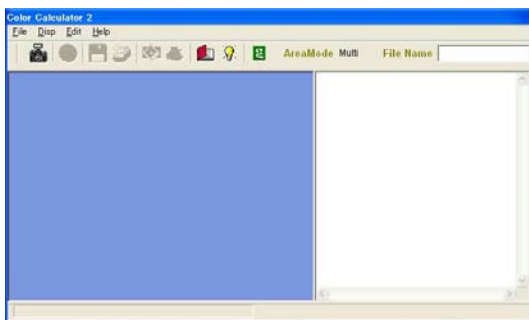
ISO: 100  
Exposure Mode: M  
shutter Speed: 1/125  
Aperture: F5.6  
Focus Mode: MF  
Metering: Center weighted  
Preset white balance: Tungsten  
D-R: OFF



## 2. Checking of Image

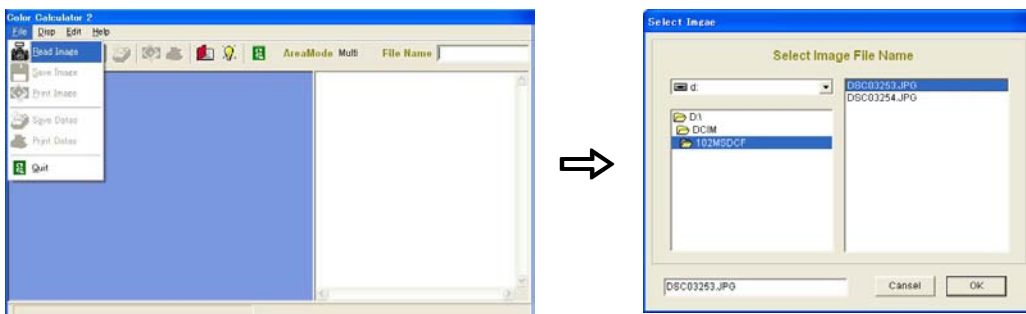
**Note:** Check the image of both master lens and checking lens.

- 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



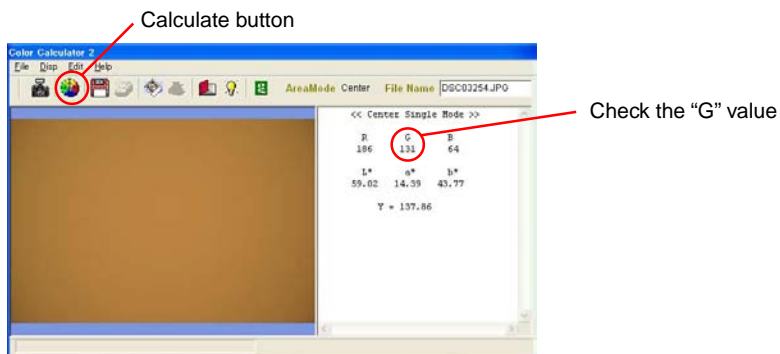
**Fig.4-2-6**

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

$$\text{Aperture error} = -30 \pm 5$$

- 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)
- Name ring wrench (72mm)

### 1. Adjustment Method

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

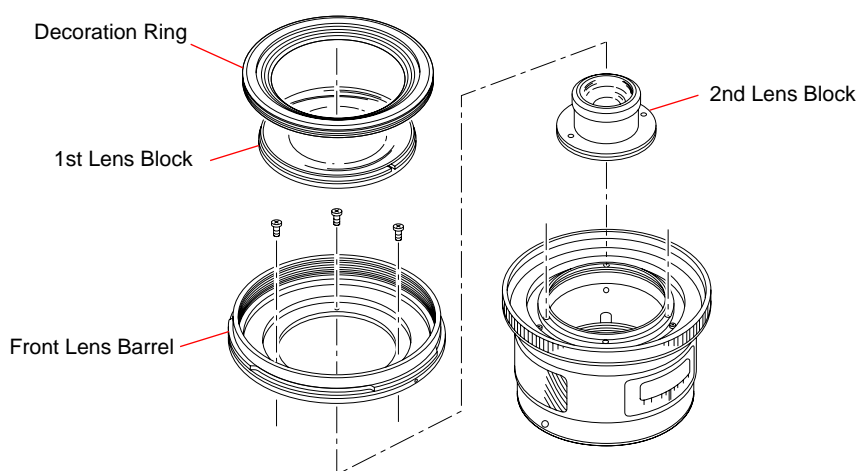


Fig.4-2-9

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

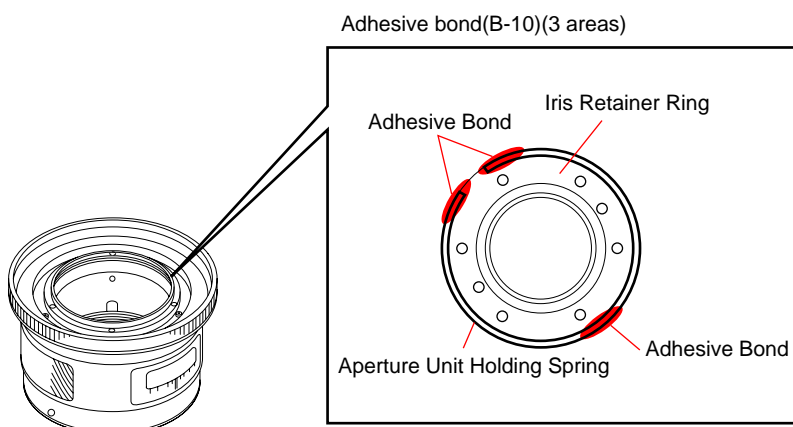
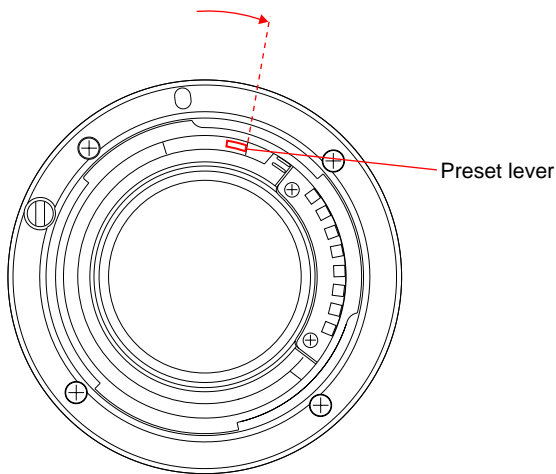


Fig.4-2-10

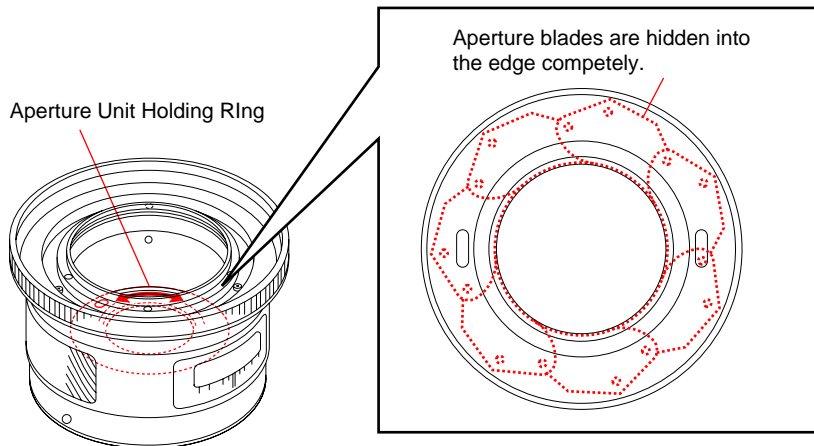
- 3) Move the preset lever to set the preset ring at the open aperture position.

Set the preset ring at the open aperture position.



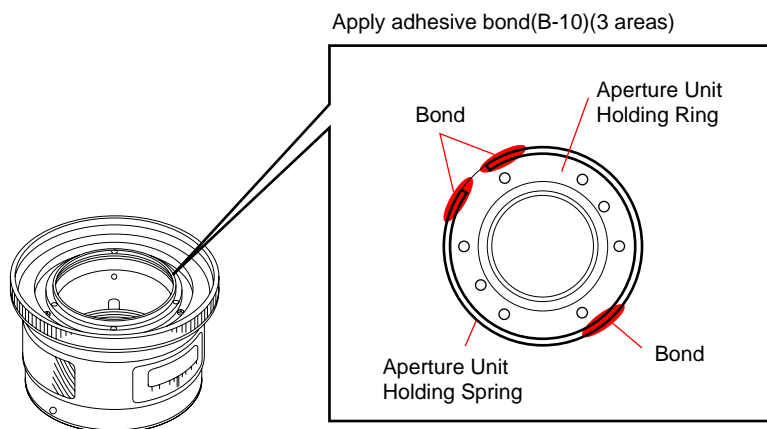
**Fig.4-2-11**

- 4) Turn the aperture unit holding ring to adjust the position that the aperture blades 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.

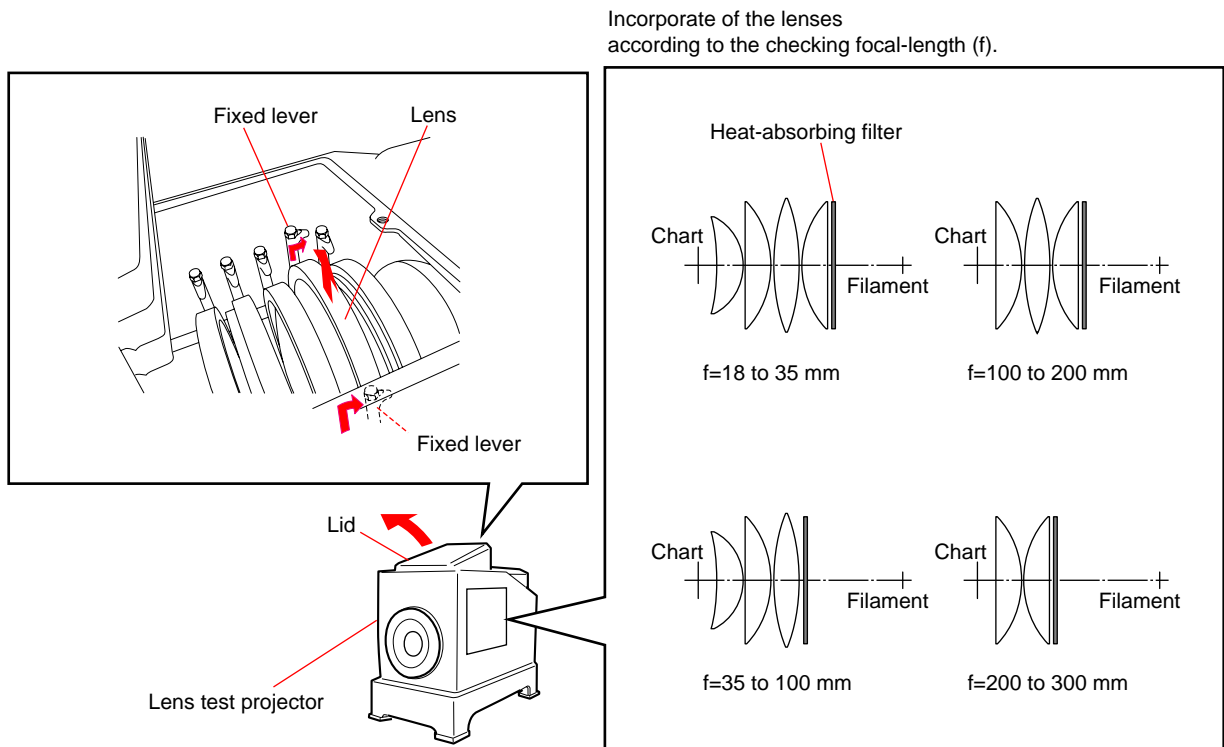
Focal-length $f$ (mm)	distance (m)
20	0.7 to 0.87

**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.

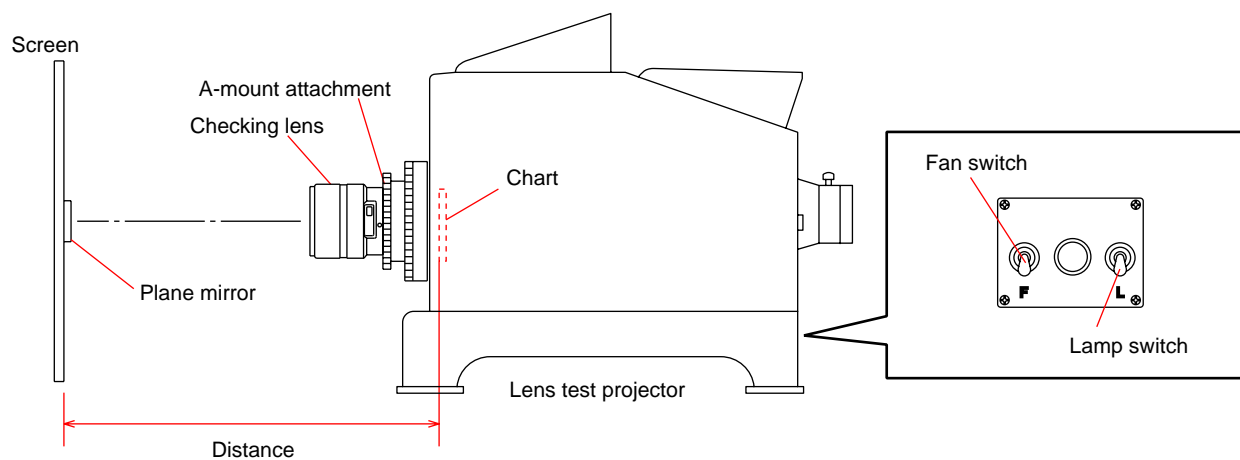
- (1) Open the lid of the lens test projector.
- (2) Pull up and turn the fixed levers on the right and left sides of the lens test projector.
- (3) Remove or insert the lens.

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



**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 focus ring 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 focus ring 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 ( $y'=0$ ).

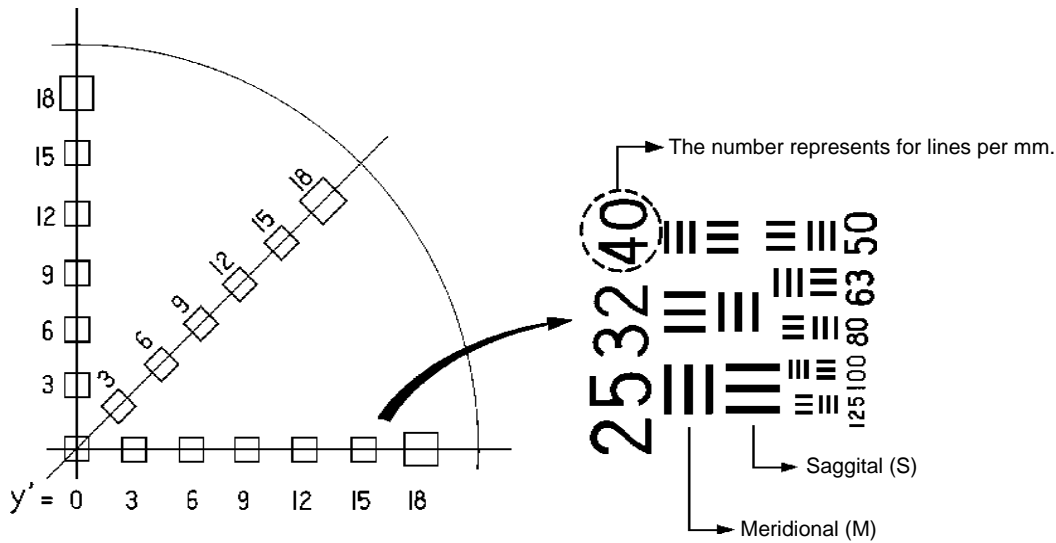


Fig.4-3-3

- 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 saggital 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.

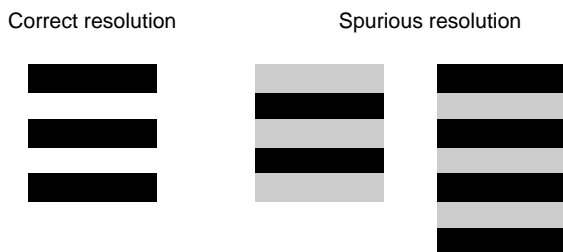


Fig.4-3-4

- 4) Check that the all readings ( $y'=0$ , saggital (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 1 group lens block, 2 group lens block and 3 group lens block.

### Specification

Focal-length f (mm)	distance (m)	Number of the smallest pitched lines		
		Center ( $y'=0$ ) (Lines per mm)	$y'=15$	
			S	M
20	0.7 to 0.87	100 or greater	50 or greater	63 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

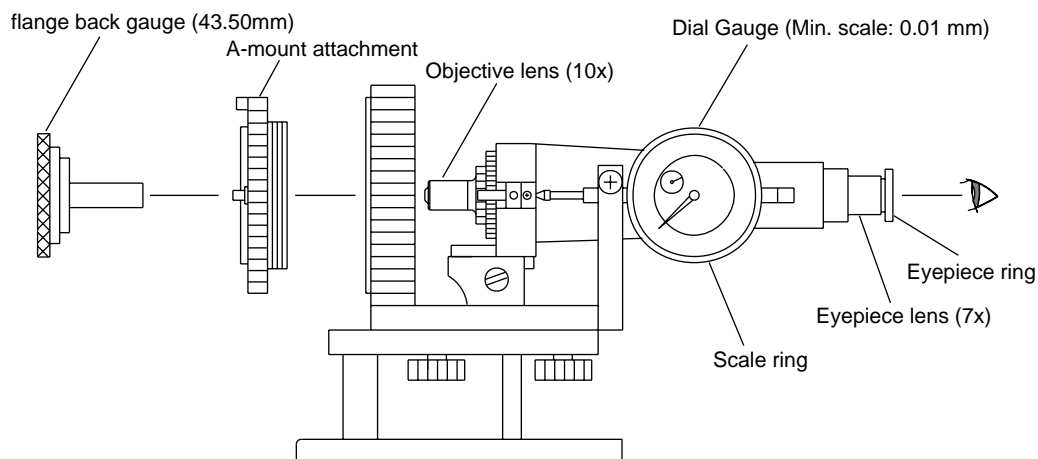
### 4-4-1. Flange Back (f'F) Check

#### Equipment

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

#### 1. Preparations

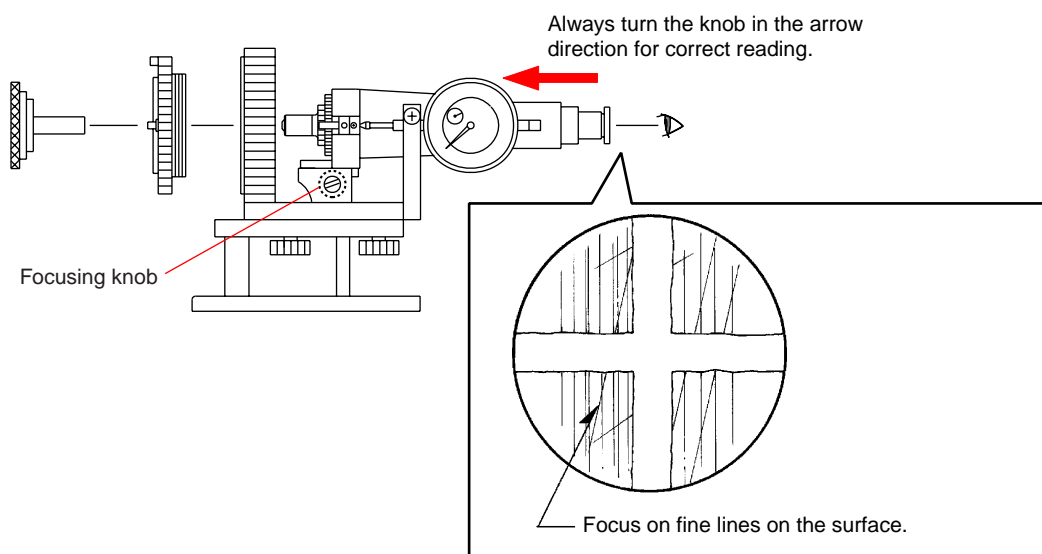
- 1) Set the equipments as shown in the Fig.4-4-1.



**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".

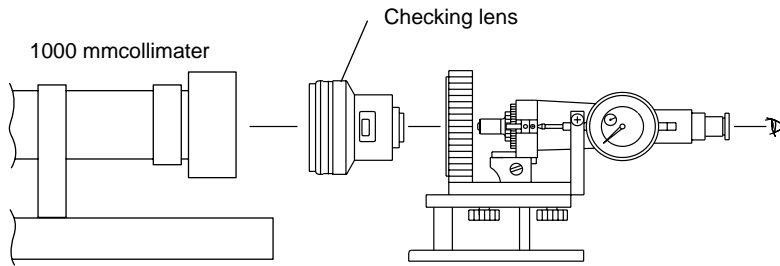
**Note:** This position is the flange back (f'F) = 43.5 mm.

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 focus ring 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.)

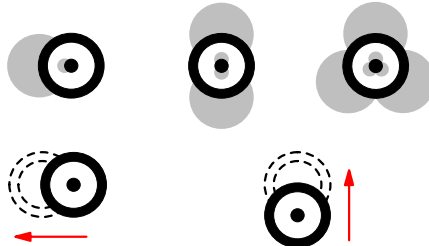
**Note:** Figure shows example. The cause depends on individual lens.

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)
20	44.56 to 44.61

**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-40)

### Adjusting Method

- 1) Depending on the result in “4-4-1 Confirmation of flange back (f'F)”, calculate the shift amount and adjust the thickness of back adjustment washer.

$$\text{Shift Amount (x)} = f'F \text{ (measured value)} - 44.58\text{mm}$$

- 2) Remove the back adjustment washer and measure the thickness of back adjustment washer with micrometer or calipers. Then, select a back adjustment washer with suitable thickness.

When the shift amount (x) is the negative (-) value, decrease the thickness of back adjustment washer.

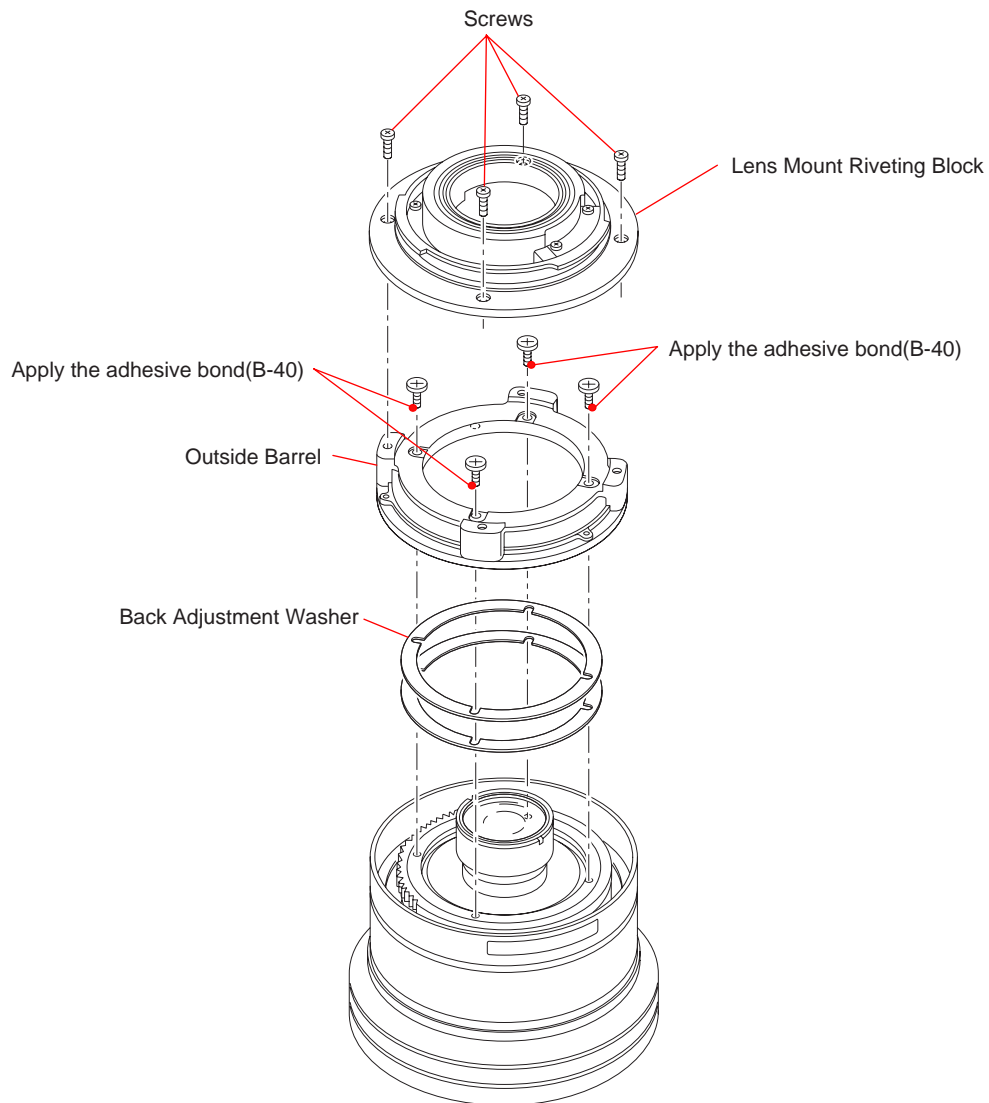
When the shift amount (x) is the positive (+) value, increase the thickness of back adjustment washer.

### Back adjustment washer

Part No.	Description
2-691-962-01	Back adjustment washer A (0.05 mm)
2-691-963-01	Back adjustment washer B (0.07 mm)
2-691-964-01	Back adjustment washer C (0.10 mm)
2-691-965-01	Back adjustment washer D (0.20 mm)
2-691-966-01	Back adjustment washer E (0.50 mm)

**Table 4-4-2**

- 3) Attach the rear light shield barrel, lens mount riveting block and outside barrel to the checking lens, and install the checking lens to the flange back tester.
- 4) Check the flange back (f'F) of the checking lens meets the specification referring to "4-4-1. Flange Back (f'F) Check."  
If not to meet the specification, replace the back adjustment washer referring to step 1, 2 of adjustment method, and check flange back again.
- 5) After the adjustment is completed, remove the rear light shield barrel and lens mount riveting block once. Apply adhesive bond (B-40) to the four screws, and then fix the outer tube with four these screws. (Refer to HELP08.)
- 6) Attach the rear light shield barrel and lens mount riveting block. (Refer to HELP09.)



**Fig.4-4-5**

## 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.

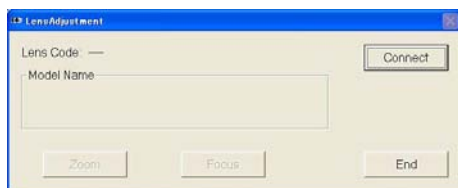
### Equipment

- 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**

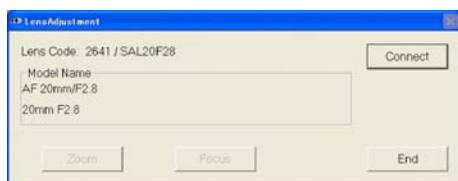
### 2. Checking Method

- 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.



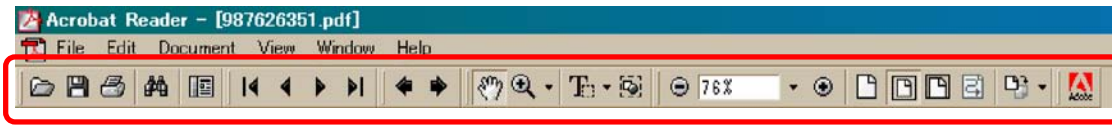
**Fig. 4-5-2**

- 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)]**




Toolbar



**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:**

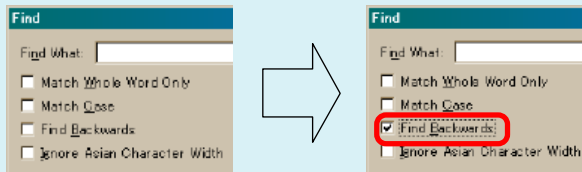
This function allows you to go and back between circuit diagram and printed circuit board diagram, and accordingly it will be convenient for the voltage check.

**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 Backward” 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.

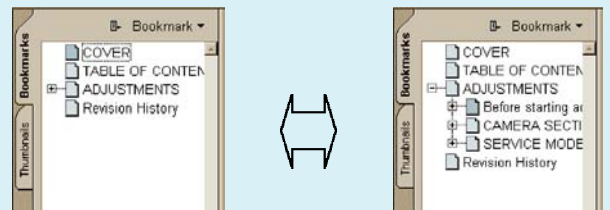
**Moving with link**

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.

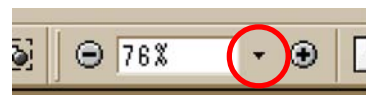
(To go back to original state, click )




**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"> <li>• Change of Repair Parts (<a href="#">Section 2</a>, <a href="#">Section 3</a>, <a href="#">Section 4</a>)</li> </ul>	Yes
1.2	2007.05	Correction-1 (C1)	<ul style="list-style-type: none"> <li>• Correction of Parts Number S.M Correction: <a href="#">Page 2-2</a></li> <li>• Correction of Parts Name and spelling errors               <ul style="list-style-type: none"> <li>• Ornamental Ring → Decoration Ring</li> <li>• Front Ornamental Plate → Front Decoration Plate</li> </ul> </li> <li>• ADJUSTMEN → ADJUSTMENT</li> <li>• Polyester Tape (Black) 10mm → Polyester Tape (Black) 10mm</li> <li>• focusi ring → focus ring</li> <li>• Mirror Tube → Front Lens Barrel</li> <li>• Prest Ring Pin → Preset Ring Pin S.M Correction: <a href="#">Page 2-2</a>, <a href="#">2-4</a>, <a href="#">3-1</a> <a href="#">HELP02</a>, <a href="#">HELP08</a>, <a href="#">HELP13</a></li> <li>• Description of Service Tool S.M Correction: <a href="#">Page 4-1</a>, <a href="#">4-7</a></li> </ul>	Yes