SAL1870

(3.5-5.6/18-70) (DT 18-70mm F3.5-5.6)

SERVICE MANUAL

Ver. 1.5 2008.04
Revision History

How to use Acrobat Reader

Revised-2

Replace the previously issued SERVICE MANUAL 9-876-947-12 with this Manual.

US Model
Canadian Model
AEP Model
Chinese Model

Link

- SPECIFICATIONS
- DISASSEMBLY
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- About the Lens Test Projector

LENS FOR DSLR CAMERA

SONY

2008D0800-1

Published by Kohda TEC

SPECIFICATIONS

- This lens is equipped with a distance encoder. The distance encoder allows more accurate measurement (ADI) by using a flash for ADI.
- 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)
27-105

Lens groups elements
9-11

Angle of view *1
76°-23°

*1 The values for equivalent 35mm-format focal length and angle of view are based on Digital Single Lens Reflex Cameras equipped with an APS-C sized image sensor.

Minimum focus *2 (m (feet))
0.38 (1.2)

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

Maximum magnification (X)
0.25

Minimum f-stop
f/22-36

Filter diameter (mm)
55

Dimensions (maximum diameter × height) (mm (in.))
Approx. 66 × 77 (2 5/8 × 3 1/8)

Mass (g (oz.))
Approx. 235 (8 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.

TABLE OF CONTENTS

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!!

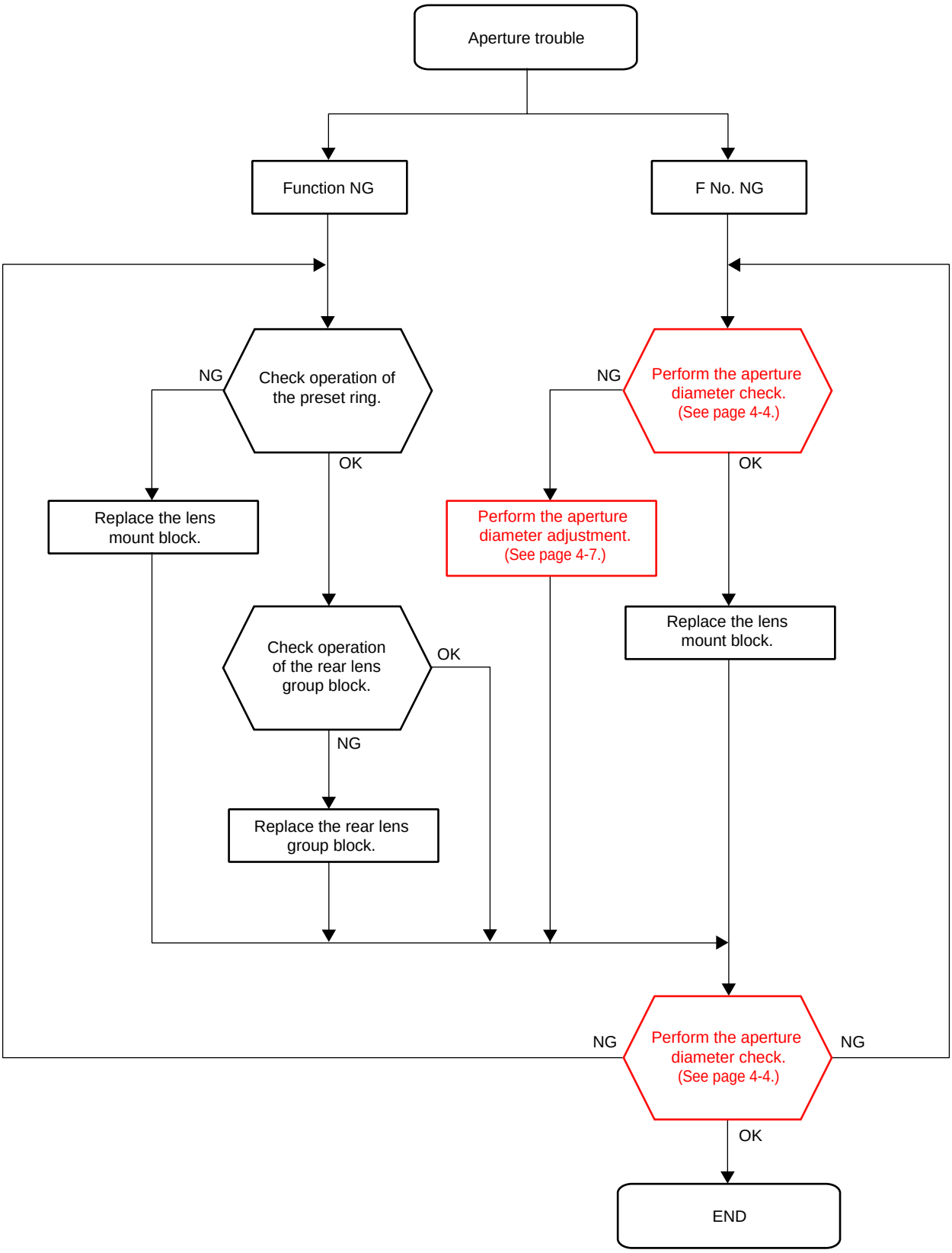
COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

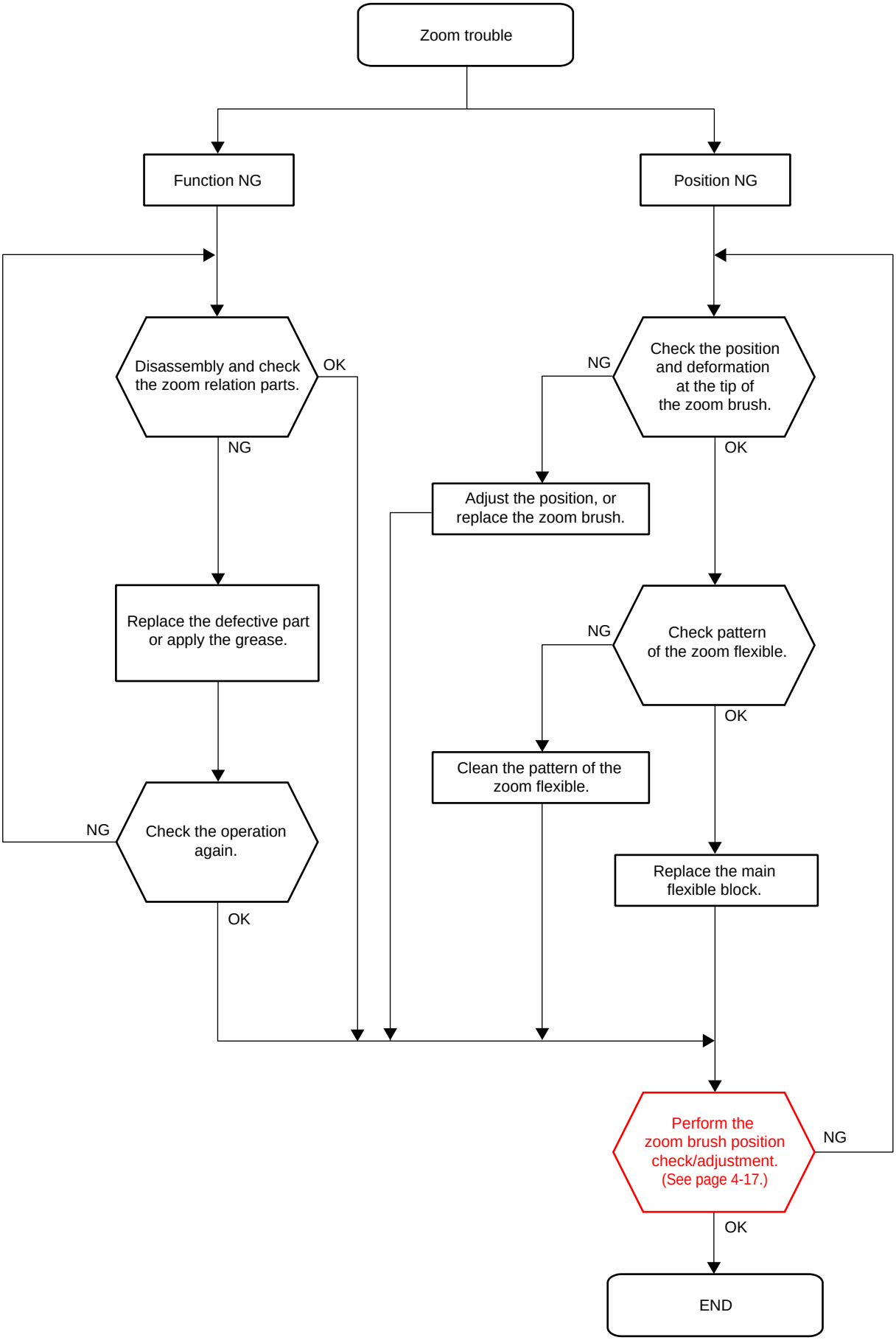
LES COMPOSANTS IDENTIFÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈSES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPÉMENTS PUBLIÉS PAR SONY.

1-5. TROUBLESHOOTING

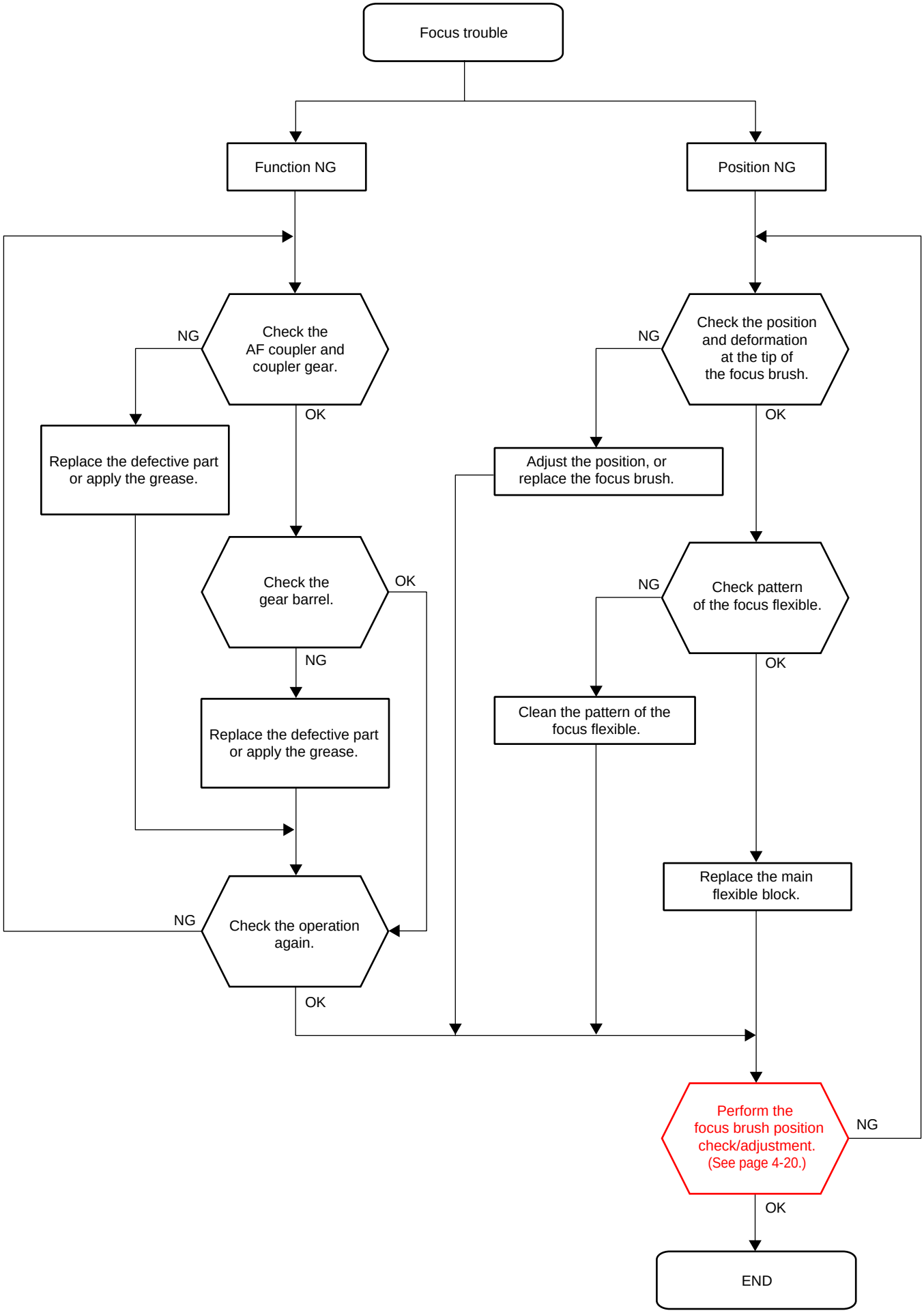
1-5-1. Aperture Trouble



1-5-2. Zoom Trouble



1-5-3. Focus Trouble

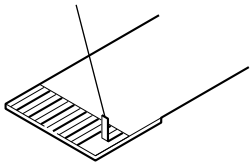


2. DISASSEMBLY

NOTE FOR REPAIR

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

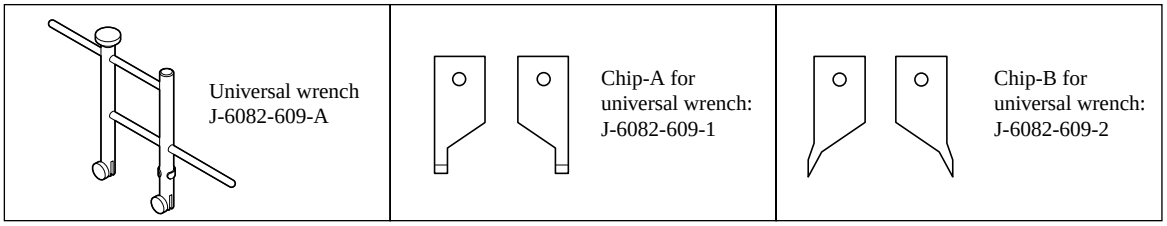
Cut and remove the part of gilt which comes off at the point. (Be careful or some pieces of gilt may be left inside)



UNIVERSAL WRENCH

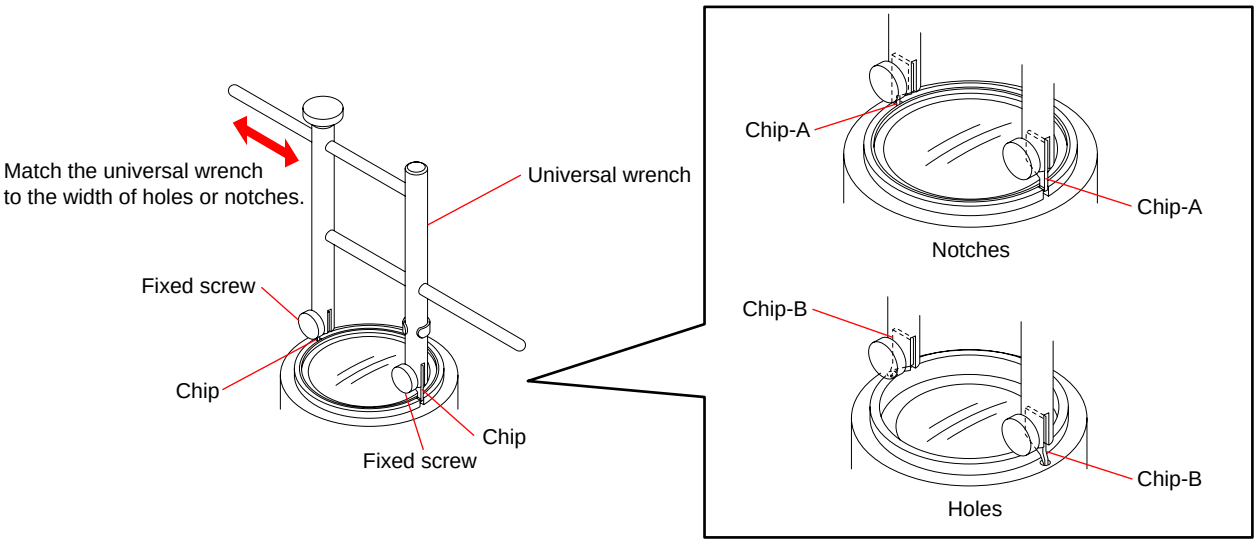
In case of the following notches or holes are located in the lens block, etc during disassembling/ assembling the lens, Use the universal wrench.

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.

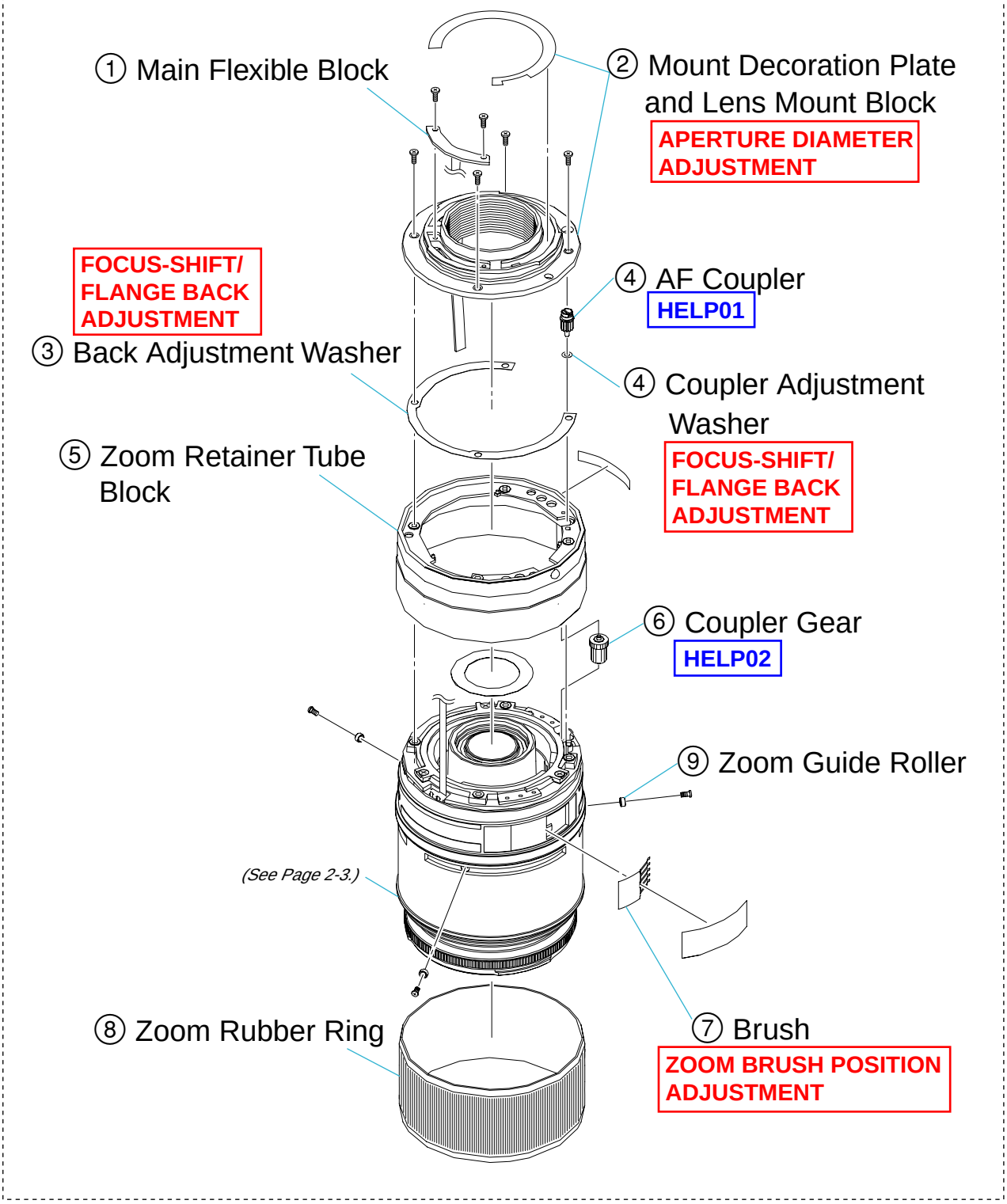


When top of tip does not reach holes or notches because the fixed screw becomes obstructive, replace the fixed screw to below.
+B 3X5 7-682-546-09

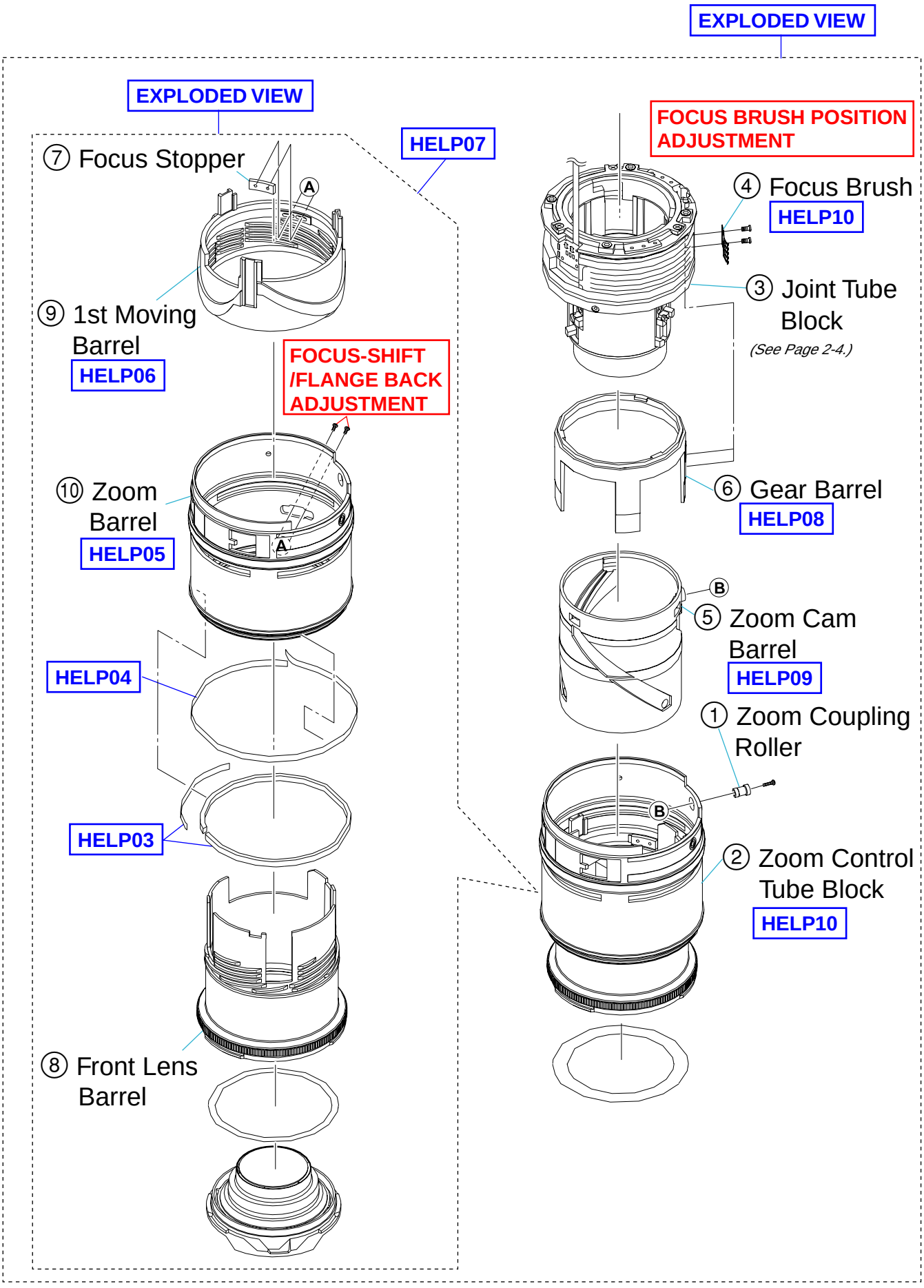
2-1. DISASSEMBLY

2-1-1. LENS MOUNT BLOCK AND ZOOM RETAINER TUBE BLOCK

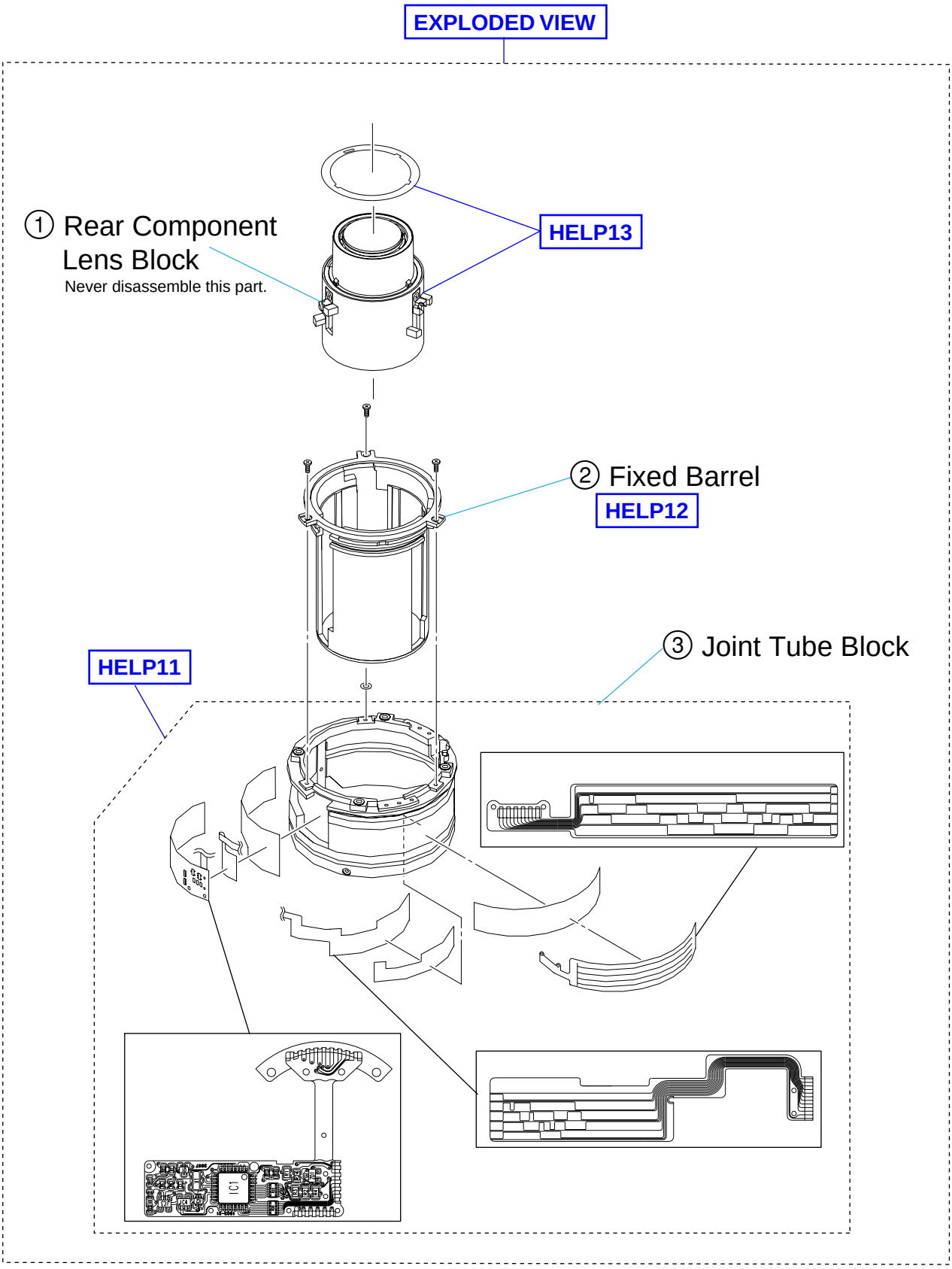
EXPLODED VIEW



2-1-2. GEAR BARREL, ZOOM CAM BARREL AND ZOOM CONTROL TUBE BLOCK



2-1-3. JOINT TUBE BLOCK



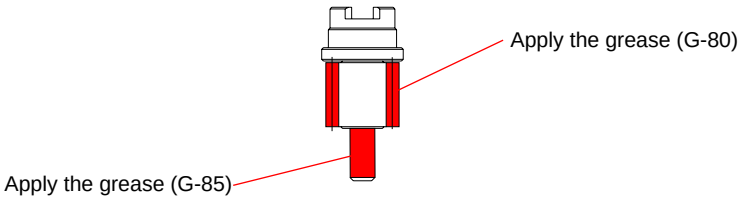
HELP

Note for assembling and grease applying positions are shown.

HELP01

Grease (G-80): J-6082-625-A
Grease (G-85): J-6082-626-A

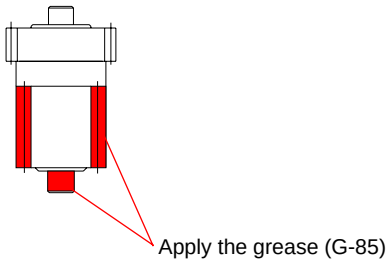
Apply the grease (G-80, G-85) to the instruction part of the AF coupler.



HELP02

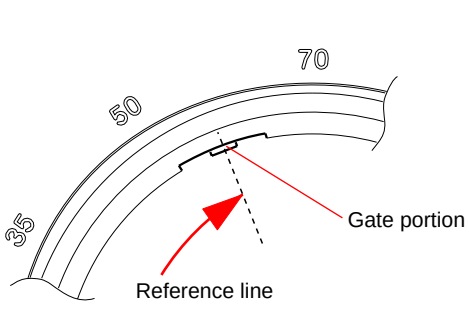
Grease (G-85): J-6082-626-A

Apply the grease (G-85) to the instruction part of the coupler gear.

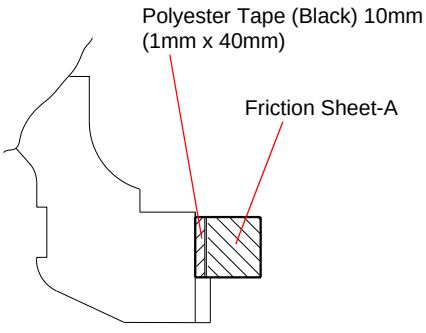


HELP03

Attach the polyester tape (black) 10mm and friction sheet-A to the zoom barrel as illustrated.



Tip portion of the zoom barrel

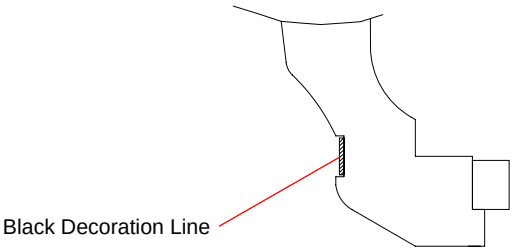


Enlarged section of the zoom barrel

HELP04

Attach the black decoration line to the zoom barrel as illustrated.

Note: Attach the black decoration line from the opposite side of zoom scale “35” for hiding the extra scraps.

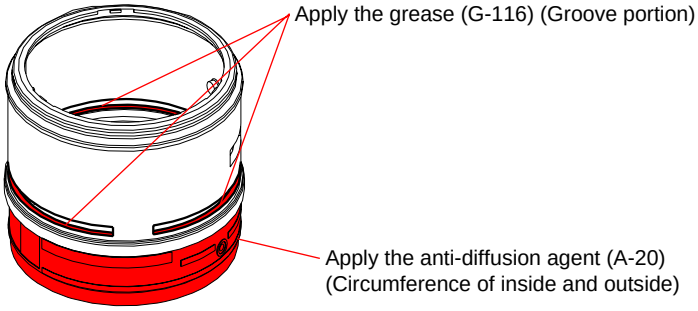


Enlarged section of the zoom barrel

HELP05

Grease (G-116): J-6082-628-A
Anti-diffusion agent (A-20): J-6082-611-A

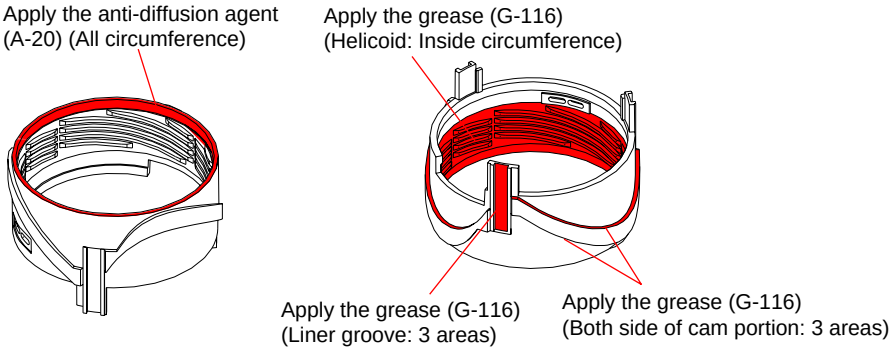
Apply the grease (G-116) and anti-diffusion agent (A-20) to the instruction part of the zoom barrel.



HELP06

Grease (G-116): J-6082-628-A
Anti-diffusion agent (A-20): J-6082-611-A

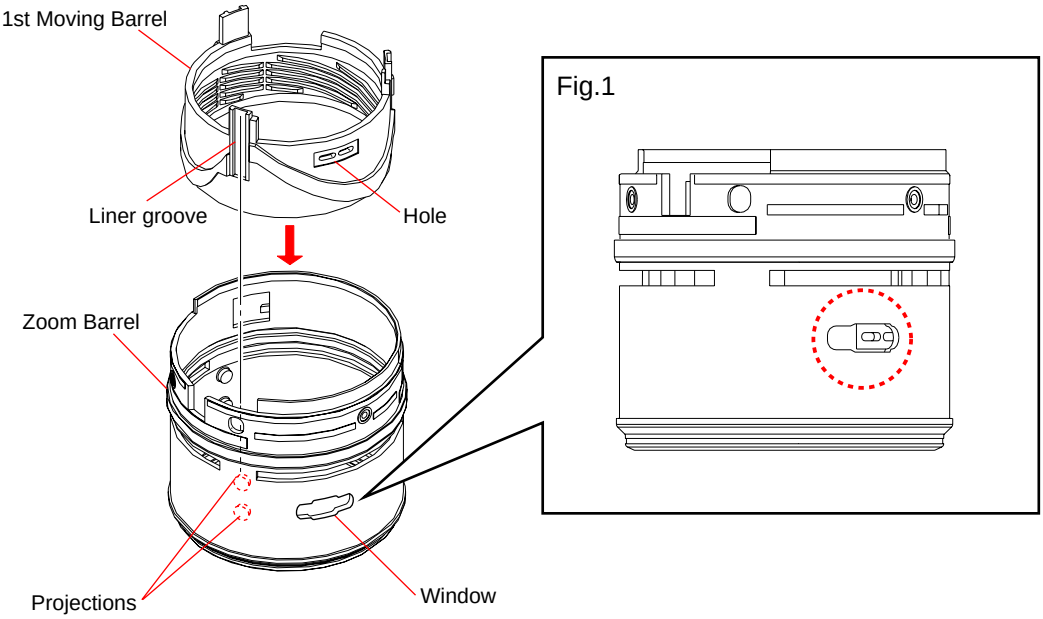
Apply the grease (G-116) and anti-diffusion agent (A-20) to the instruction part of the 1st moving barrel.



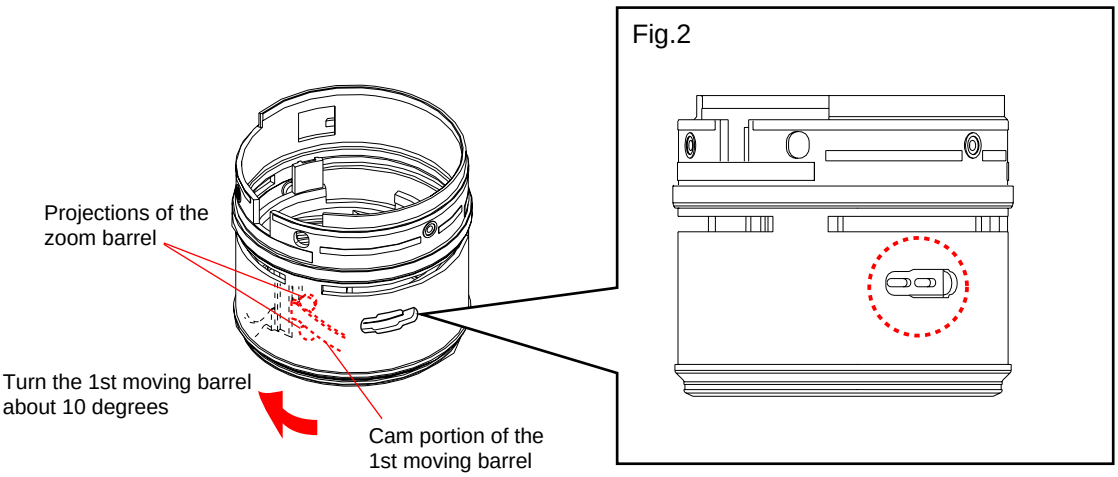
HELP07

Anti-diffusion agent (A-20): J-6082-611-A
Adhesive bond (B-10): J-6082-612-A

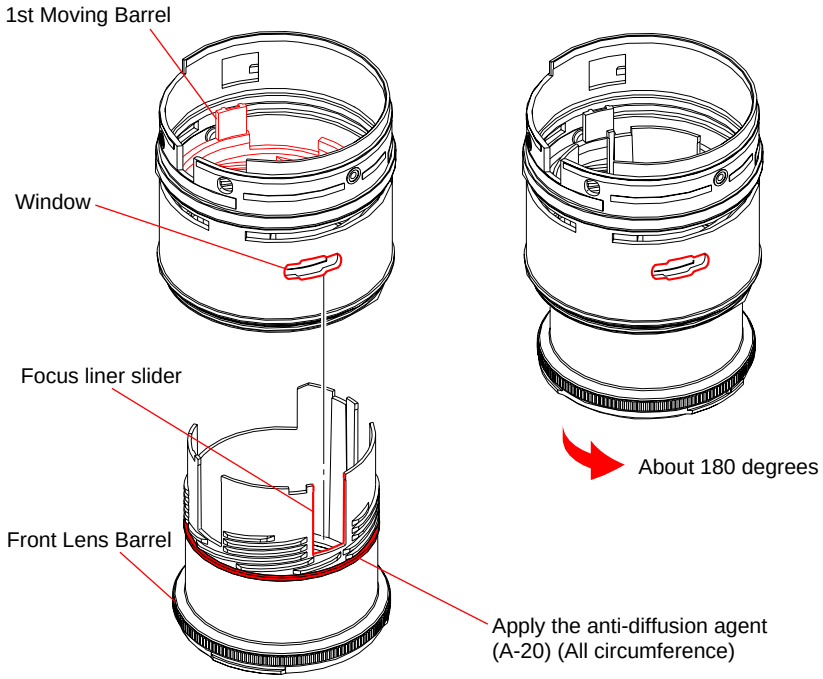
1. Match the positions of 1st moving barrel and zoom barrel as illustrated.
2. Insert the 1st moving barrel into the zoom barrel to the end with setting projection and linear groove.
   After inserting, check that the positions of the window of zoom barrel and the hole of 1st moving barrel are as shown in the Fig.1.



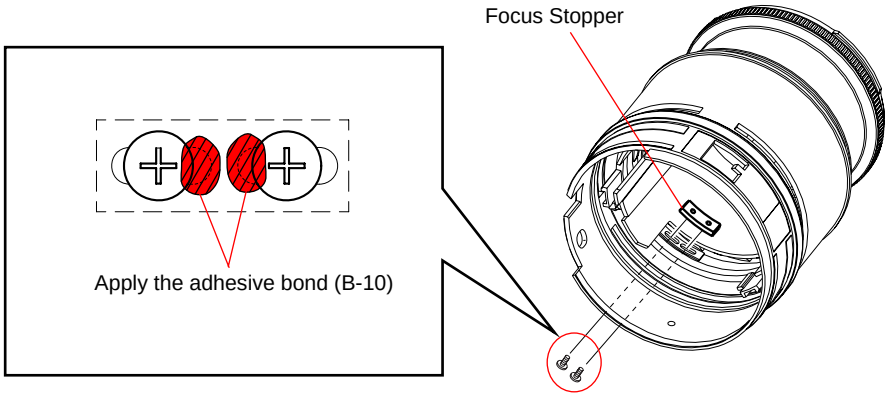
3. Turn the 1st moving barrel to the arrow direction about 10 degrees, and engage the cam part of the 1st moving barrel and projection of the zoom barrel as shown in the figure.
   Check that the positions of the window of zoom barrel and the hole of 1st moving barrel are as shown in the Fig.2.



4. Apply the anti-diffusion agent (A-20) to the instruction part of the front lens barrel.
5. Match the positions of the window and the focus linear slider as shown in the figure, and attach the front lens barrel to the 1st moving barrel.
6. Connect helicoidally the front lens barrel to the 1st moving barrel by turning it about 180 degrees in the direction of the arrow.



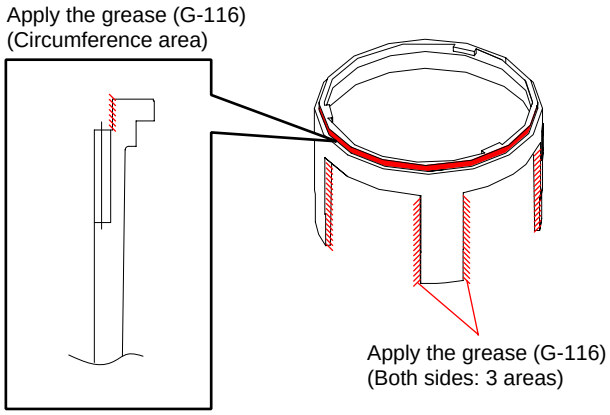
7. Attach the focus stopper as shown in the figure, and fix it with the two screws tentatively.
8. After the focus-shift/flange back (f'F) adjustment is completed, apply the adhesive bond (B-10) as shown in the figure.



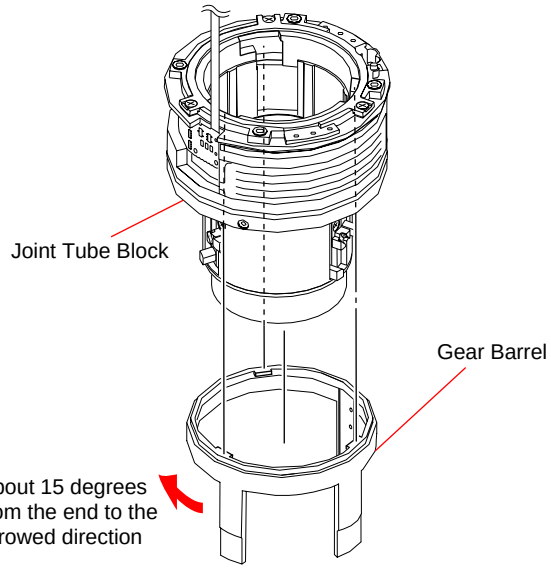
HELP08

Grease (G-116): J-6082-628-A

1. Apply the grease (G-116) to the instruction part of the gear barrel.



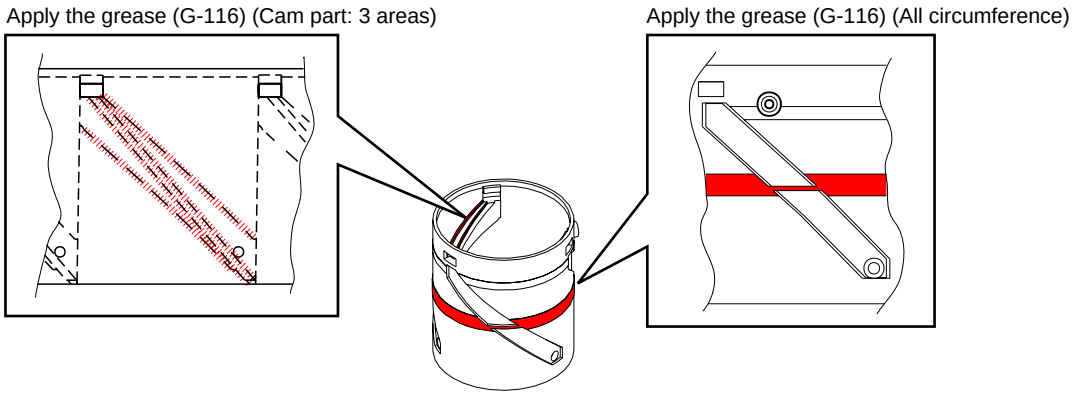
2. Match the positions of joint tube block and gear barrrel, and insert the gear barrel into the joint tube block to the end as shown in the figure.
3. Turn the gear barrel about 15 degrees from the end to the arrowed direction, and engage bayonet to the joint tube block.



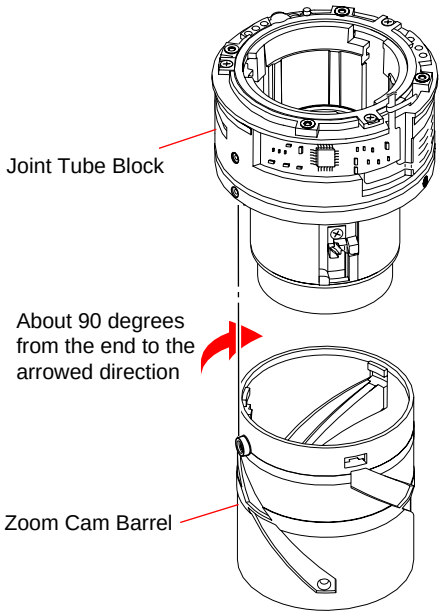
HELP09

Grease (G-116): J-6082-628-A

1. Apply the grease (G-116) to the instruction part of the zoom cam barrel.

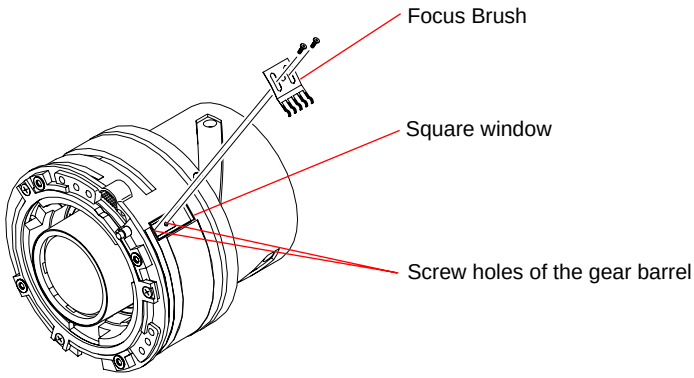


2. Match the positions of joint tube block and zoom cam barrel, and insert the zoom cam barrel into the joint tube block to the end as shown in the figure.
3. Turn the zoom cam barrel about 90 degrees from the end to the arrowed direction, and engage bayonet to the joint tube block.

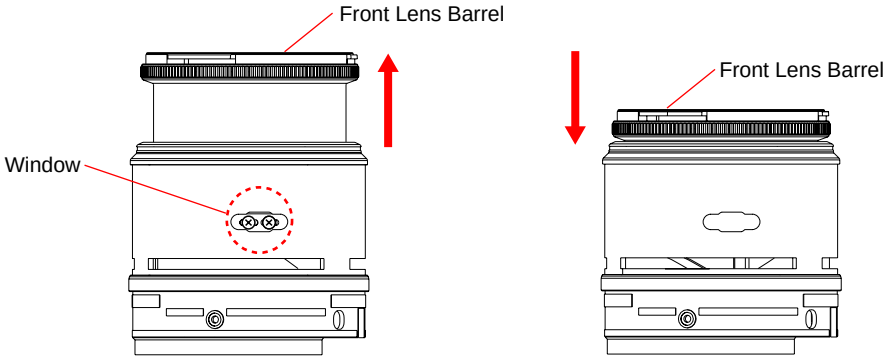


HELP10

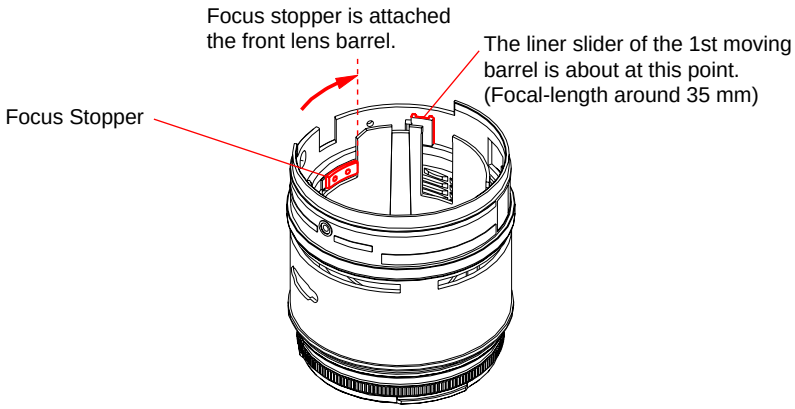
1. Turn the gear barrel until the two screw holes of the gear barrel are seen from the square window as shown in the figure.
2. Attach the focus brush to the gear barrel, and fix them with the two screws tentatively.



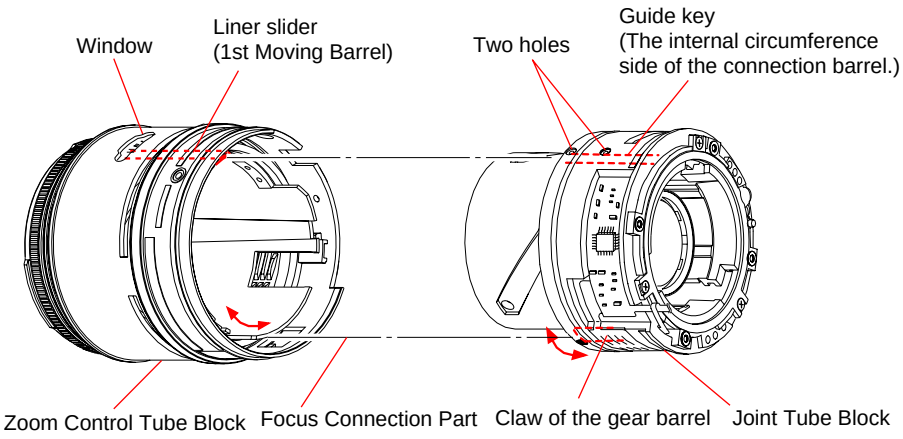
3. Pull the front lens barrel to the telephoto end, and check that the two screw heads are seen from the window.
4. Put the zoom control tube block on the desk to let the front lens barrel sink into the deepest point with its weight, and keep the position.



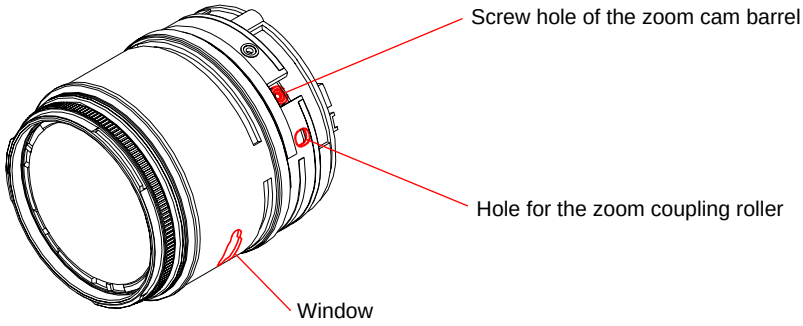
5. Check that the position of the zoom control tube block is as shown in the figure when seeing the inside in the state of step 4.



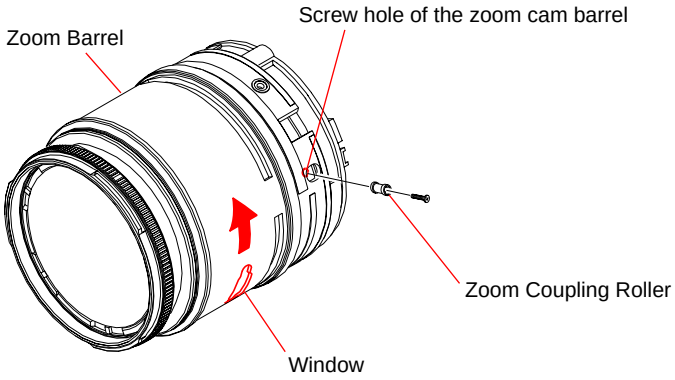
6. Match the positions of the linear slider positioned at the window of the zoom control tube block and the guide key positioned at two holes of joint tube block.
7. Insert the joint tube block into the zoom control tube block to the end.
   Note: If it cannot be inserted, return to step 1, and check that the focus connection part is matched to the claw of the gear barrel.



8. After inserting, check that the position is as shown in the figure.



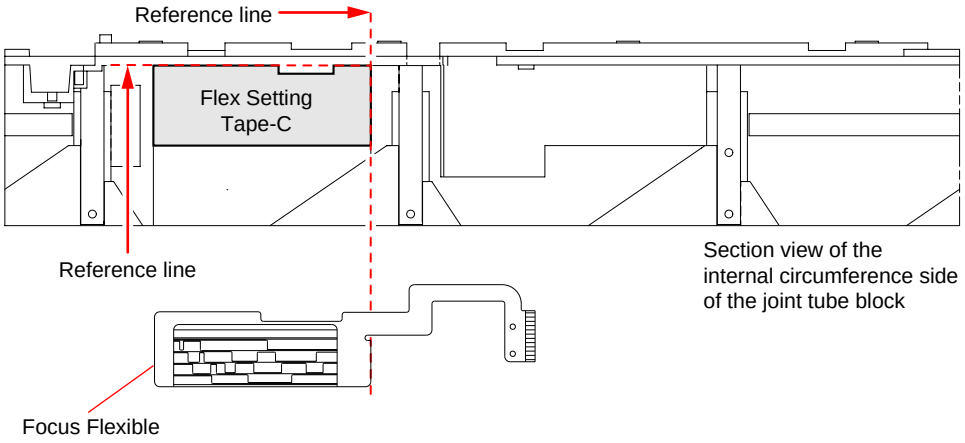
9. Turn the zoom barrel until the screw hole of the zoom cam barrel is seen from the hole of the zoom barrel as shown in the figure.
10. Attach the zoom coupling roller, and fix it with the screw.



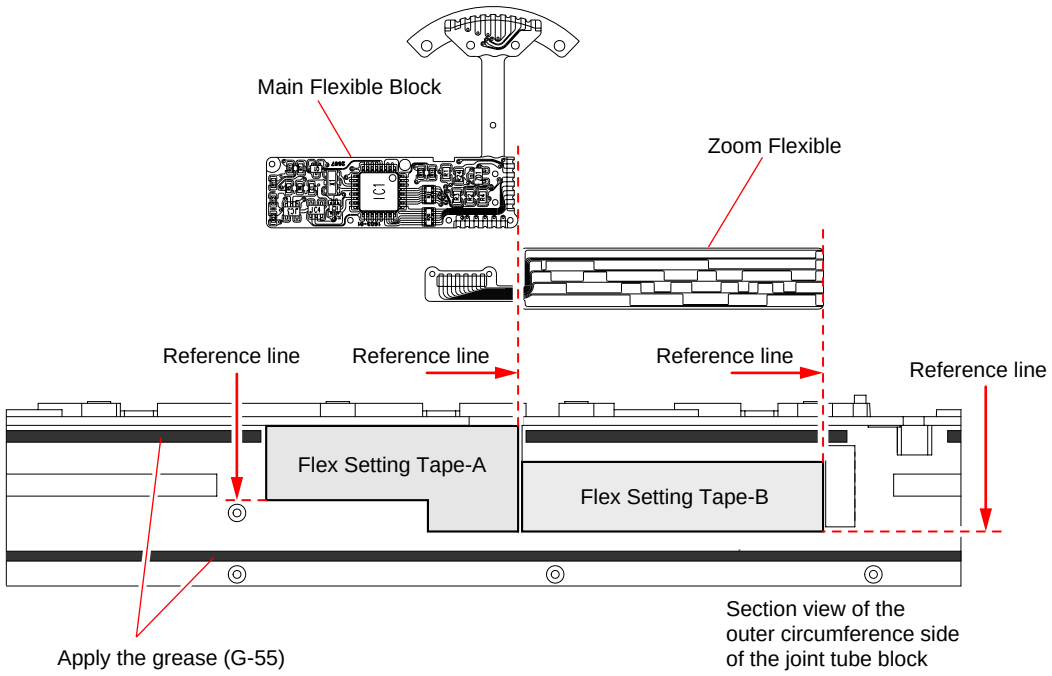
HELP11

Anti-diffusion agent (A-20): J-6082-611-A
Grease (G-55): J-6082-623-A

1. Attach the flex setting tape-C to the internal circumference side of the joint tube block, and attach the focus flexible as shown in the figure.
2. Apply the anti-diffusion agent (A-20) to the internal circumference side of the joint tube block (Except the focus flexible).



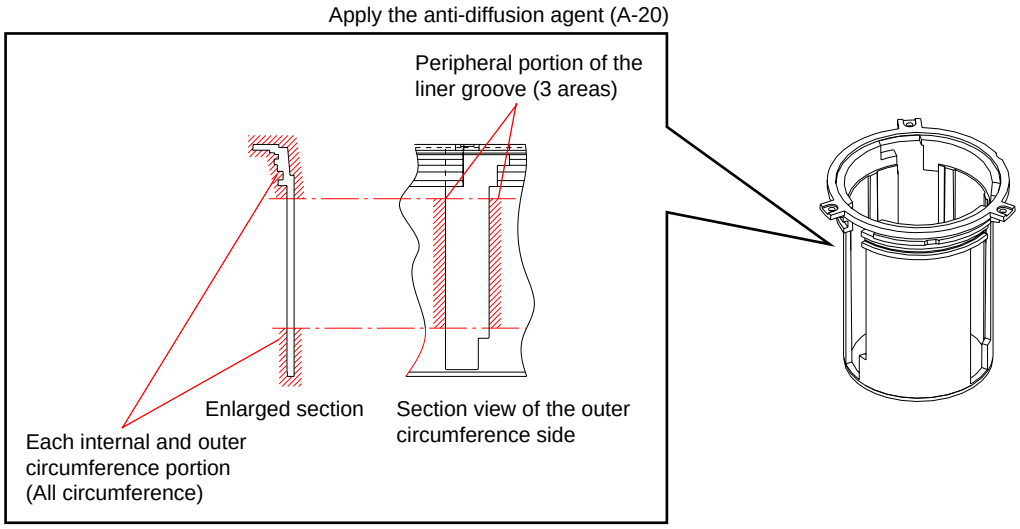
3. Attach the flex setting tape-A and flex setting tape-B to the outer circumference side of the joint tube block, and attach the zoom flexible and main flexible block as shown in the figure.
4. Apply the anti-diffusion agent (A-20) to the outer circumference side of the joint tube block (Except the zoom flexible and main flexible block).
5. Apply the grease (G-55) to the instruction part of the joint tube block.



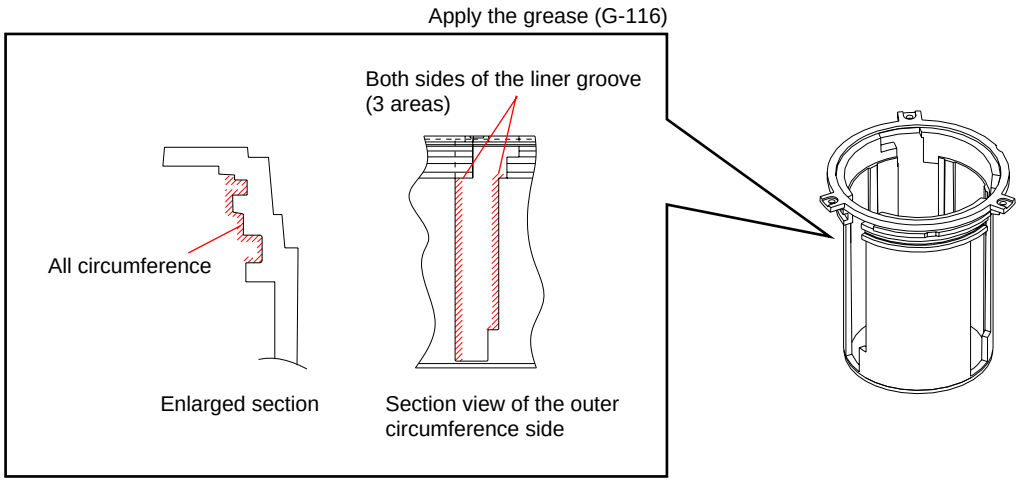
HELP12

Anti-diffusion agent (A-20): J-6082-611-A
Grease (G-116): J-6082-628-A

1. Apply the anti-diffusion agent (A-20) to the instruction part of the fixed barrel.



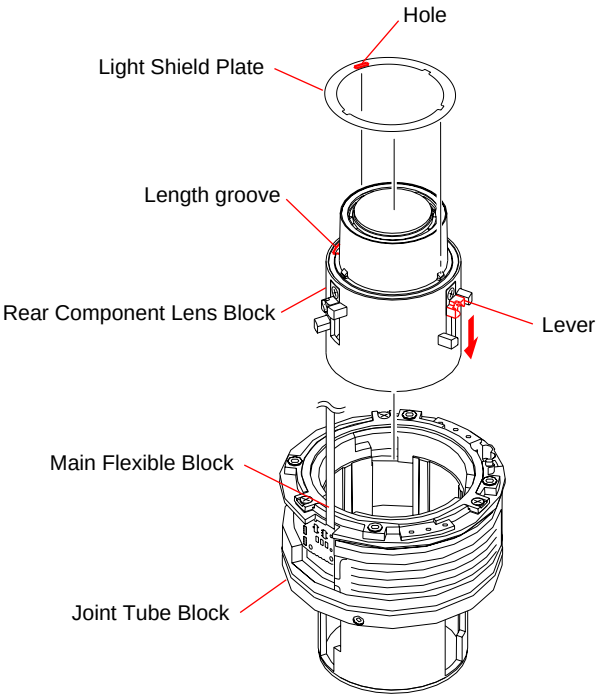
2. Apply the grease (G-116) to the instruction part of the fixed barrel.



HELP13

1. Attach the light shield plate to the rear component lens block as shown in the figure.
2. Turn the light shield plate, and match the hole of light shield plate to the length groove part of rear component lens block.
3. Insert the rear component lens block into the joint tube block to the end.

Note: Keep the lever lowered, and insert the rear component lens block as shown in the figure.



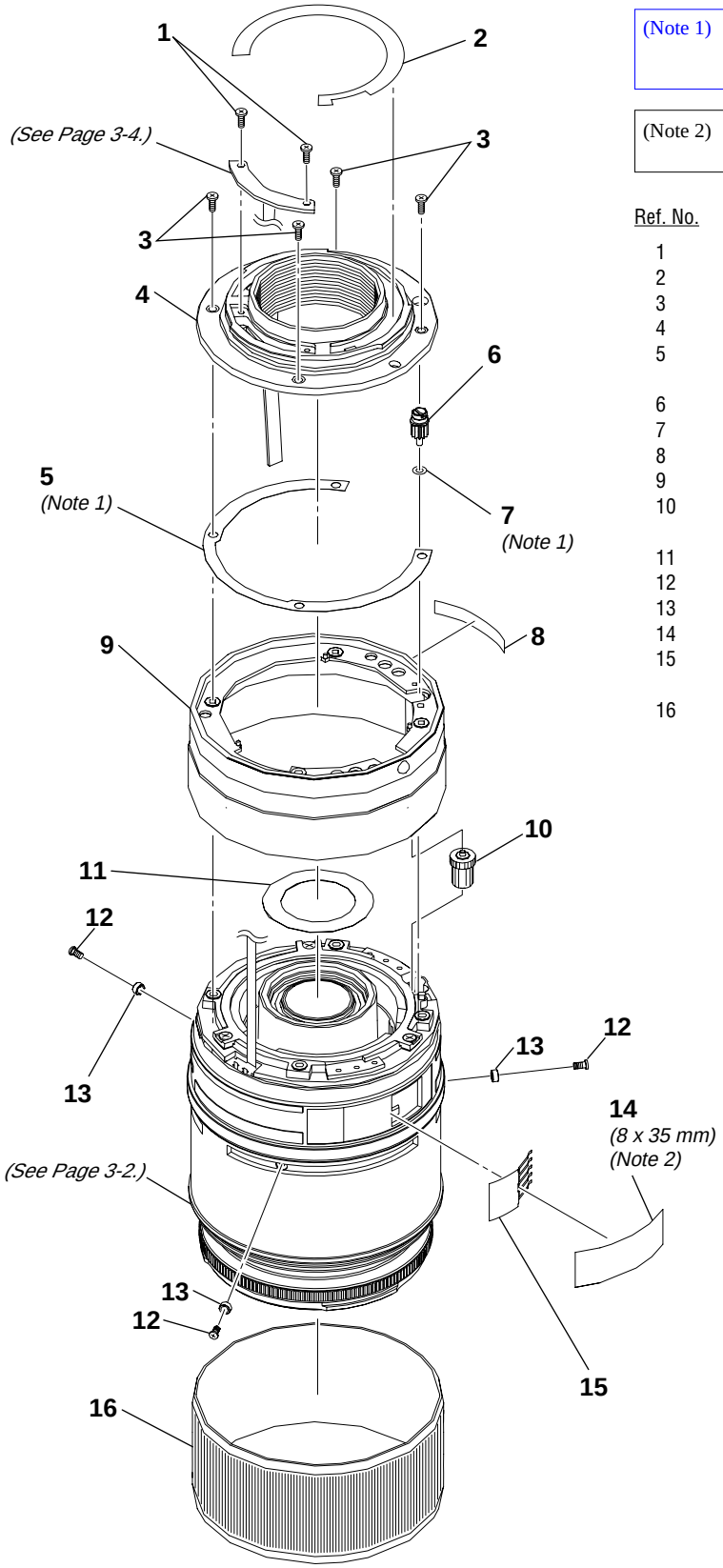
3. REPAIR PARTS LIST

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. LENS MOUNT BLOCK AND ZOOM RETAINER TUBE BLOCK

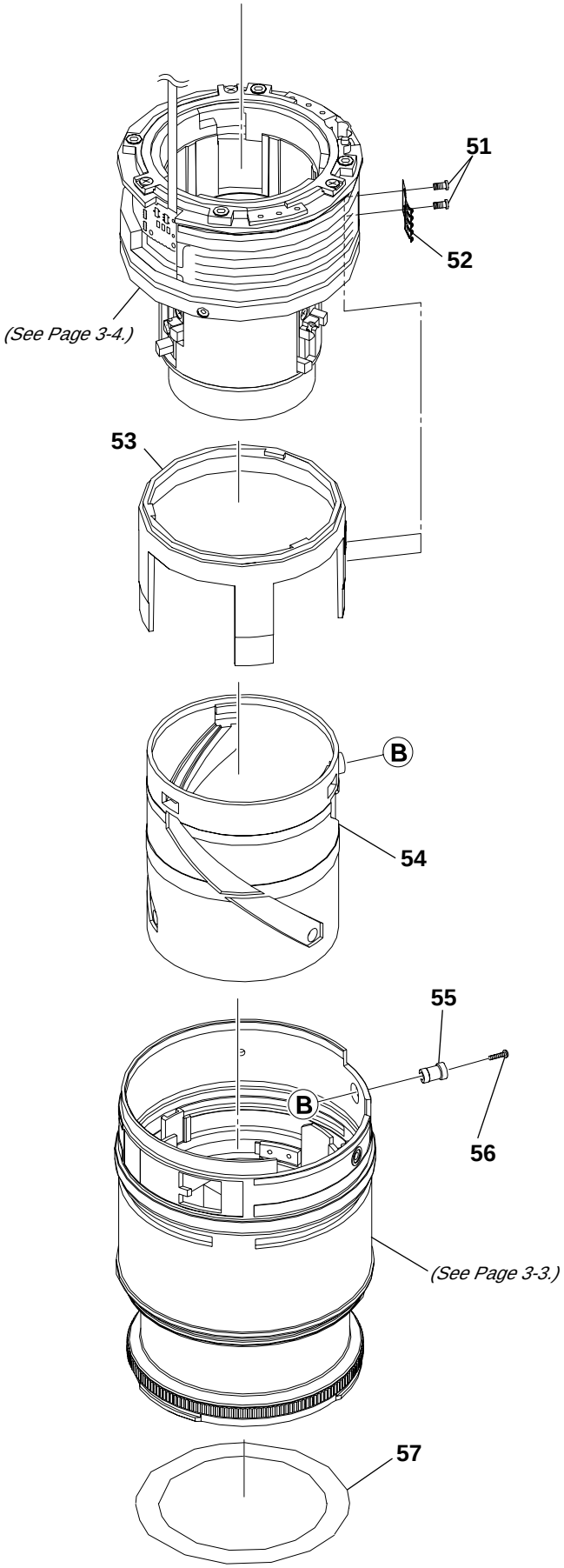


(Note 1) The number or type of these parts need to be selected according to adjustment etc..
Select the part referring to page 3-5.

(Note 2) Cut the polyester tape (black) 10mm (per roll/black) (Ref. No. 14) for 8×35 mm.

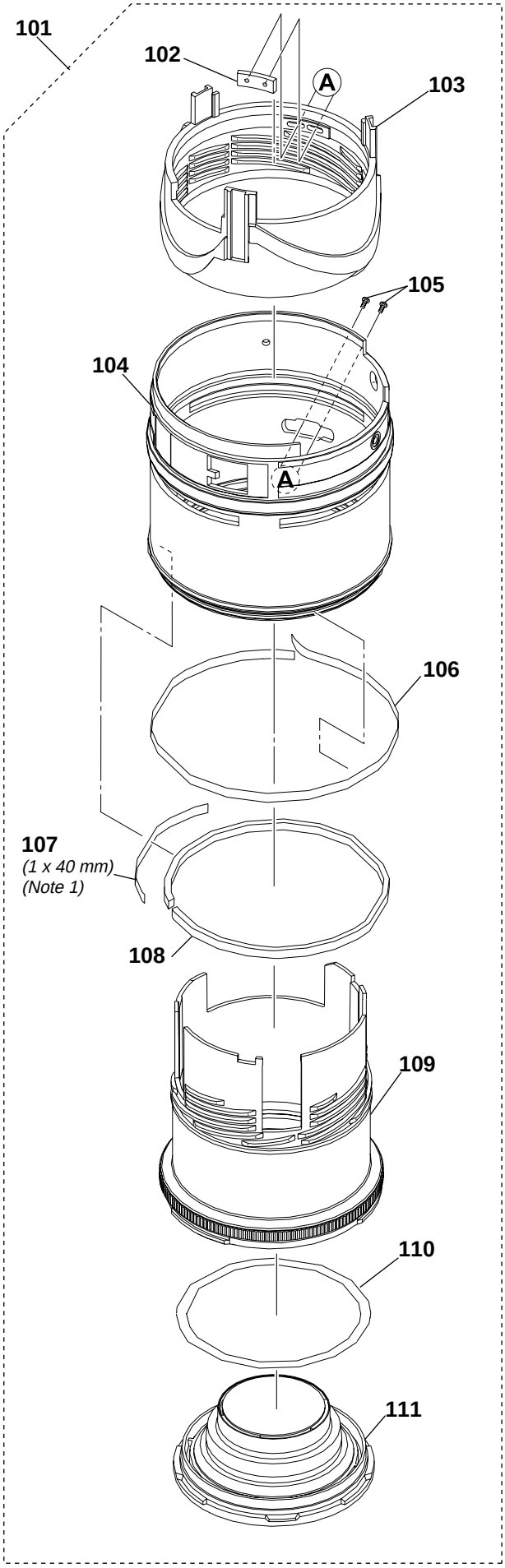
Ref. No.	Part No.	Description
1	2-683-654-01	SCREW, TAPPING P1 M1.7X3.5
2	2-683-655-01	MOUNT DECORATION PLATE
3	2-683-653-01	SCREW, TAPPING M2.0X6.0
4	A-1189-527-A	BLOCK, LENS MOUNT
5	Selection part	BACK ADJUSTMENT WASHER-A to E (Note 1)
6	2-683-640-01	AF COUPLER
7	Selection part	COUPLER ADJUSTMENT WASHER-A to E (Note 1)
8	2-683-613-01	LENS NUMBER PLATE
9	A-1189-526-A	BLOCK, ZOOM RETAINER TUBE
10	2-683-639-01	COUPLER GEAR
11	2-683-669-01	4TH LENS GROUP DECORATION PLATE
12	2-683-636-01	SCREW, TAPPING M1.7X3.5
13	2-683-635-01	ZOOM GUIDE ROLLER
14	9-913-210-03	POLYESTER TAPE (BLACK) (Note 2)
15	2-691-543-01	BRUSH
16	2-683-612-01	ZOOM RUBBER RING

3-1-2. GEAR BARREL AND ZOOM CAM BARREL



Ref. No.	Part No.	Description
51	2-683-629-01	SCREW, TAPPING P1 M1.4X2.0
52	2-683-628-01	FOCUS BRUSH
53	2-683-626-01	GEAR BARREL
54	2-683-627-01	ZOOM CAM BARREL
55	2-698-431-01	ZOOM COUPLING ROLLER
56	2-683-631-01	SCREW, TAPPING M2.0X8.0
57	2-683-690-01	DECORATION PLATE

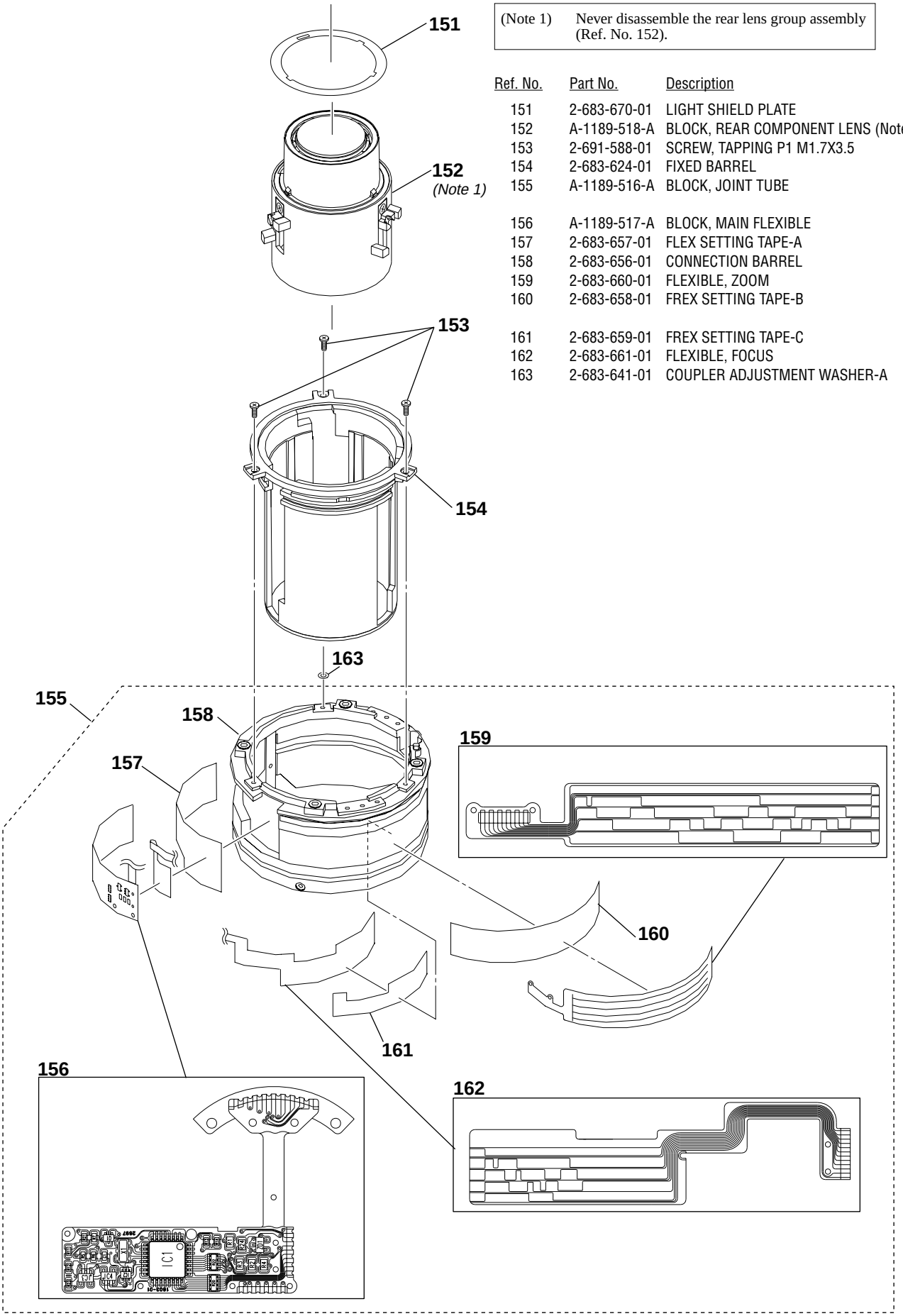
3-1-3. ZOOM CONTROL TUBE BLOCK



(Note 1)	Cut the polyester tape (per roll) yellow (Ref. No. 107) for 1×40 mm.

Ref. No.	Part No.	Description
101	A-1189-523-A	BLOCK, ZOOM CONTROL TUBE
102	2-683-633-01	FOCUS STOPPER
103	2-683-632-01	1ST MOVING BARREL
104	2-683-681-01	ZOOM BARREL
105	2-683-634-01	SCREW, M1.6X3.0
106	2-683-614-01	BLACK DECORATION LINE
* 107	9-913-210-00	POLYESTER TAPE (Note 1)
108	2-683-682-01	FRICTION SHEET-A
109	2-683-683-01	FRONT LENS BARREL
110	2-698-430-01	INTERVAL ADJUSTMENT WASHER
111	A-1189-525-A	BLOCK, 1 GROUP LENS

3-1-4. JOINT TUBE BLOCK



(Note 1) Never disassemble the rear lens group assembly (Ref. No. 152).

Ref. No.	Part No.	Description
151	2-683-670-01	LIGHT SHIELD PLATE
152	A-1189-518-A	BLOCK, REAR COMPONENT LENS (Note 1)
153	2-691-588-01	SCREW, TAPPING P1 M1.7X3.5
154	2-683-624-01	FIXED BARREL
155	A-1189-516-A	BLOCK, JOINT TUBE
156	A-1189-517-A	BLOCK, MAIN FLEXIBLE
157	2-683-657-01	FLEX SETTING TAPE-A
158	2-683-656-01	CONNECTION BARREL
159	2-683-660-01	FLEXIBLE, ZOOM
160	2-683-658-01	FREX SETTING TAPE-B
161	2-683-659-01	FREX SETTING TAPE-C
162	2-683-661-01	FLEXIBLE, FOCUS
163	2-683-641-01	COUPLER ADJUSTMENT WASHER-A

3-1-5. SELECTION PARTS

Ref. No.5

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

Part No.	Description
2-683-648-01	BACK ADJUSTMENT WASHER-A (T=0.05 mm)
2-683-649-01	BACK ADJUSTMENT WASHER-B (T=0.07 mm)
2-683-650-01	BACK ADJUSTMENT WASHER-C (T=0.1 mm)
2-683-651-01	BACK ADJUSTMENT WASHER-D (T=0.2 mm)
2-683-652-01	BACK ADJUSTMENT WASHER-E (T=0.5 mm)

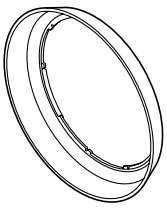
Ref. No.7

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

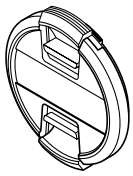
Part No.	Description
2-683-641-01	COUPLER ADJUSTMENT WASHER-A (T=0.05 mm)
2-683-642-01	COUPLER ADJUSTMENT WASHER-B (T=0.07 mm)
2-683-643-01	COUPLER ADJUSTMENT WASHER-C (T=0.1 mm)
2-683-644-01	COUPLER ADJUSTMENT WASHER-D (T=0.2 mm)
2-683-645-01	COUPLER ADJUSTMENT WASHER-E (T=0.5 mm)

3-2. SUPPLIED ACCESSORIES

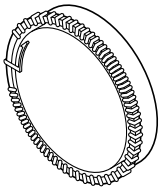
Checking supplied accessories.



Lens Hood (SH0006)
2-687-044-01



Front Lens Cap
X-2179-383-1



Rear Lens Cap
2-683-615-01

Other accessories

2-686-121-01 MANUAL, INSTRUCTION
(JAPANESE, ENGLISH, FRENCH, SPANISH, SIMPLIFIED CHINESE)
2-686-121-11 MANUAL, INSTRUCTION
(GERMAN, DUTCH, SWEDISH, ITALIAN) (AEP)
2-686-121-21 MANUAL, INSTRUCTION (PORTUGUESE, RUSSIAN,
TRADITIONAL CHINESE, KOREAN, ARABIC) (AEP)

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.

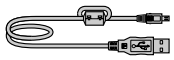
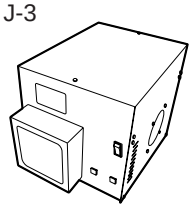
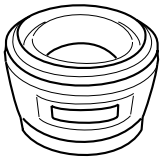
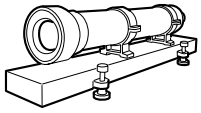
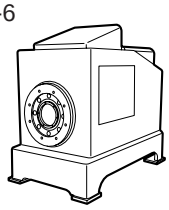
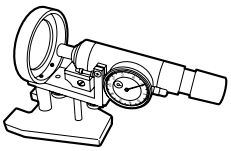
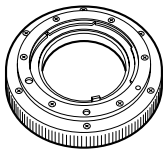
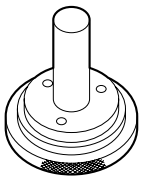
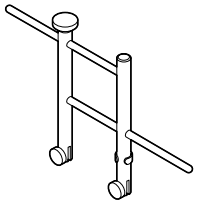
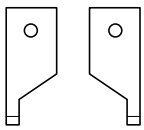
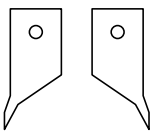
J-1  Personal computer (Note 1)	J-2  USB cord with connector 1-833-062-11	J-3  Luminance box J-6082-581-A
J-4  AE master lens J-6082-597-A	J-5  1000 mm Collimator 110V: J-6082-604-A 240V: J-6082-604-B (Note 2)	J-6  Lens test projector J-6082-605-A (Note 3)
J-7  Flange back tester J-6082-606-A	J-8  A-mount attachment J-6082-607-A	J-9  Flange back gauge (43.50mm) J-6082-608-A
J-10  Zoom barrel holder jig (Note 4)	J-11  Universal wrench J-6082-609-A	J-12  Chip-A for universal wrench J-6082-609-1
J-13  Chip-B for universal wrench J-6082-609-2		

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.

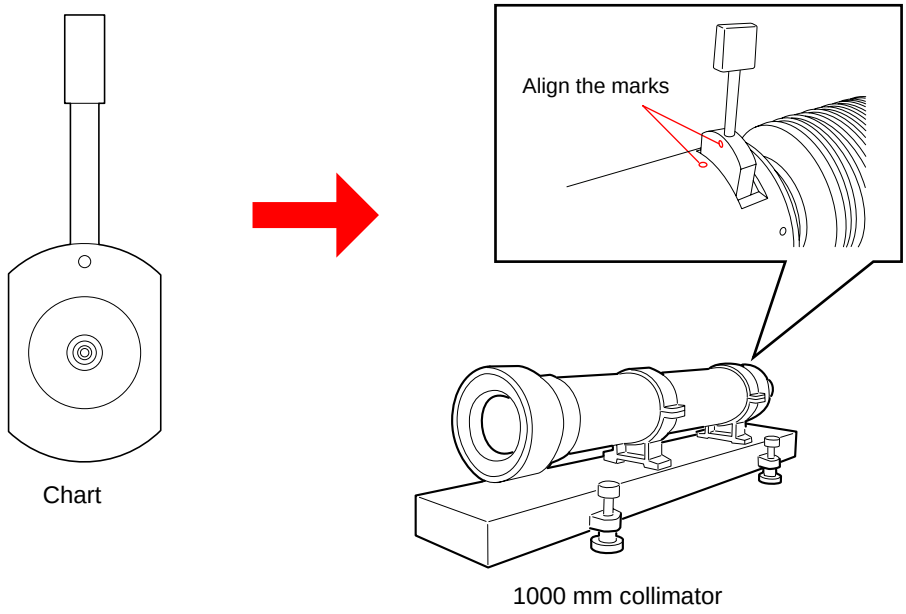


Fig. 4-1-2

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

Note 4: Modify the zoom retainer tube block as follows to make the zoom barrel holder jig.

Required Part

Zoom retainer tube block: A-1189-526-A

Making Method

1) Chop off the zoom retainer tube block as shown in Fig. 4-1-3.
2) Check that the thickness is 10 mm after cutting.

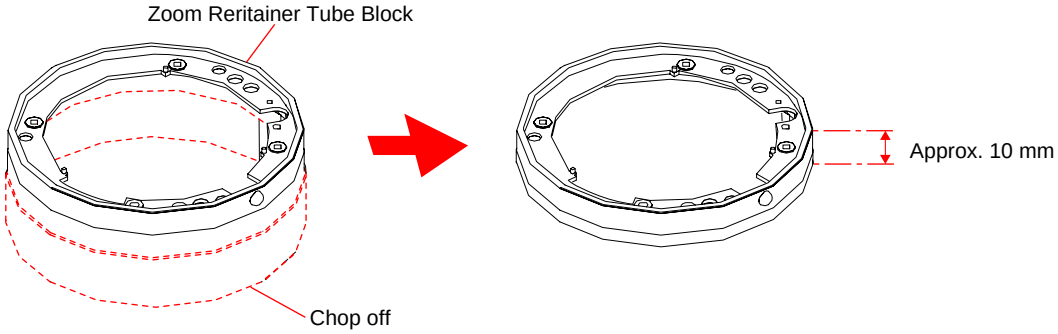


Fig. 4-1-3

4-1-2. Lens Adjustment Program

The lens adjustment program is required for the following check/adjustment.
4-5. LENS ROM CHECK
4-6. ZOOM BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK
4-7. FOCUS BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN 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 "9-852-130-5□".

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".

Ver. 1.4 2008.01

The changed portions from Ver. 1.3 are shown in blue.

4-2. APERTURE DIAMETER CHECK/ADJUSTMENT

4-2-1. Aperture Diameter Check

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

Note: Confirm the checking lens by complete. (The adjustment of focus brush and zoom brush is completed.)

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

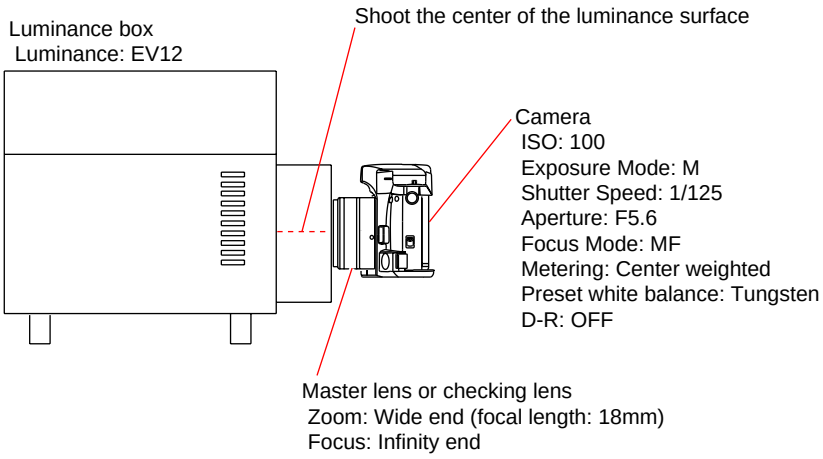


Fig.4-2-1

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:

Zoom:	Wide end (focal length: 18mm)
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.

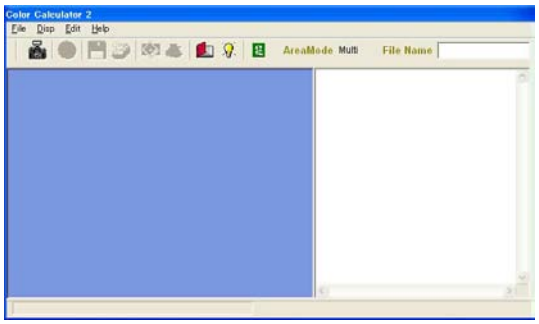


Fig.4-2-2

2) Read the image from the file menu.

Fig.4-2-3

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.4-2-4

Color space (Edit menu): sRGB

Fig.4-2-5

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

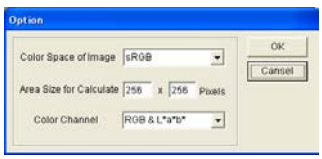


Fig.4-2-6

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)

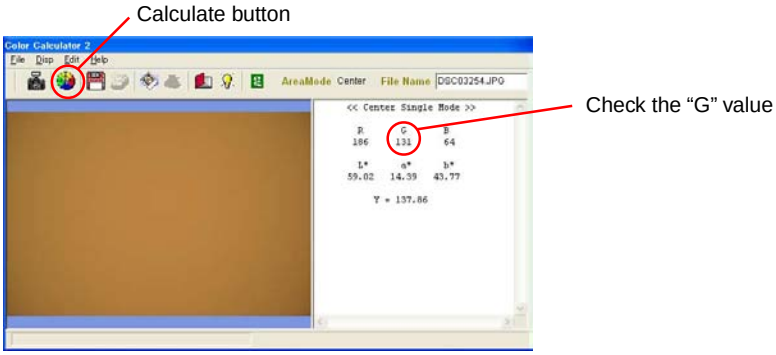


Fig.4-2-7

3. Checking Method

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

Aperture error = Average “G” value of checking lens (b) - Average “G” value of master lens (a)

Specification

Aperture error = 0 ±12

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

4-2-2. Aperture Diameter Adjustment

Equipment

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. Preparations

1) Remove the mount decoration plate.

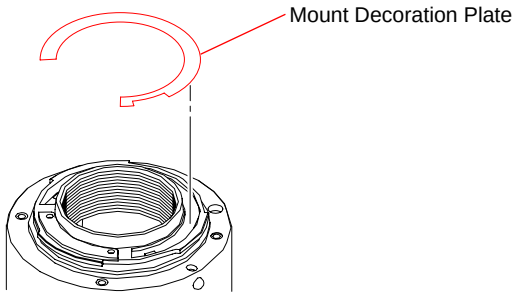


Fig.4-2-8

2) Set the zoom at the Tele end position.
3) Move the preset lever to set the preset ring at the open aperture position.

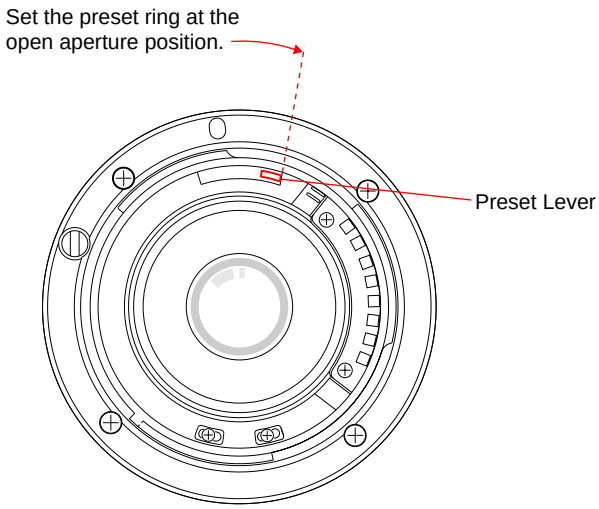


Fig.4-2-9

2. Adjusting Method

1) Let the operation lever of the preset ring move to left and right sides by loosening two screws slightly to move to left and right sides.
2) Move the two screws while seeing the lights from the rear lens element side, and tighten two screws at the point where the diaphragm blades are hidden into the edge completely.

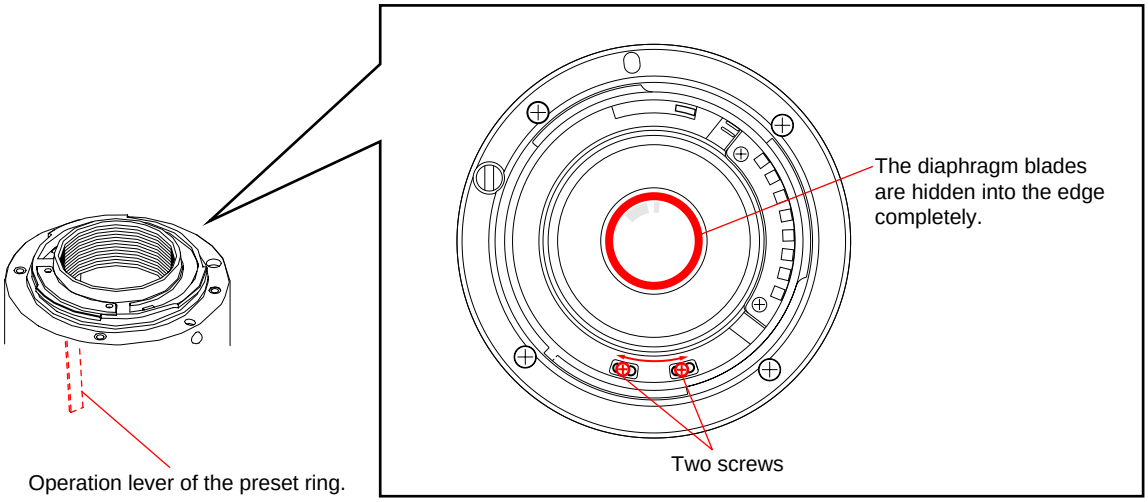


Fig.4-2-10

3) Perform “4-2-1. Aperture Diameter Check” and repeat steps 1) to 3) until the aperture error is within the specification.
4) After the adjustment is completed, apply the adhesive bond (B-10) to the two screws tightened in step 2).

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)
18	0.84
35	1.49
70	2.82

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.

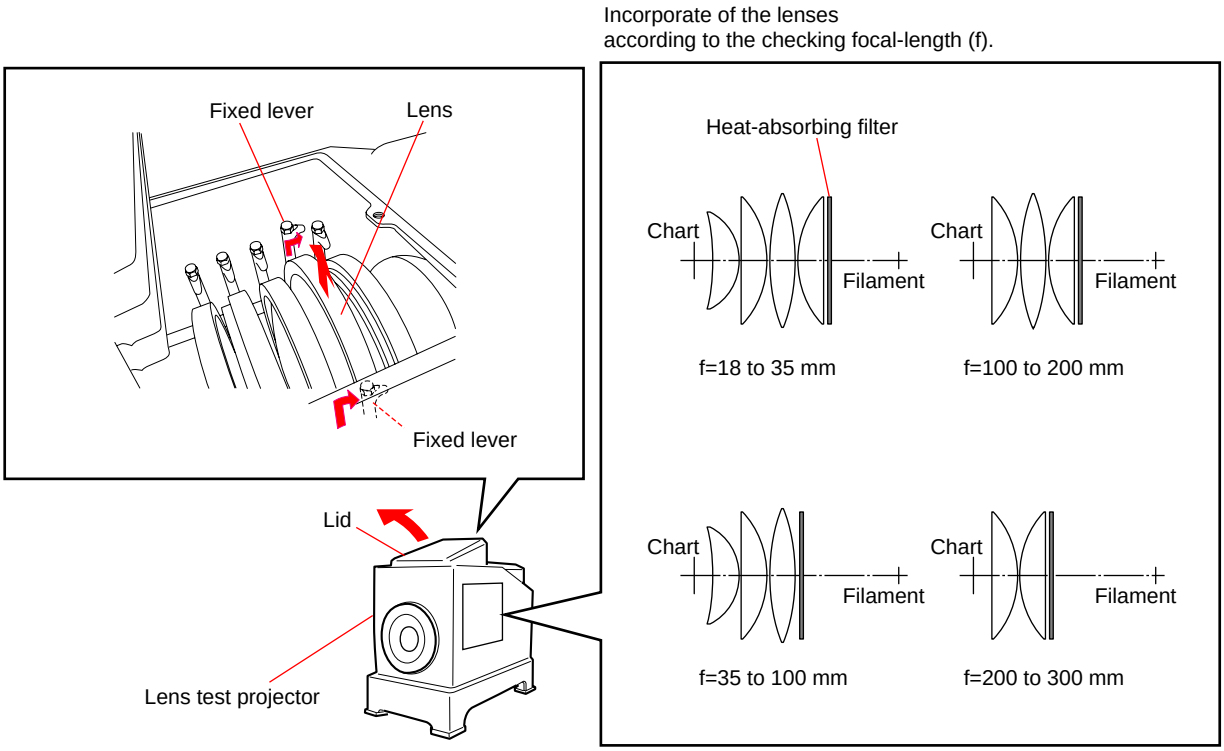


Fig.4-3-1

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.

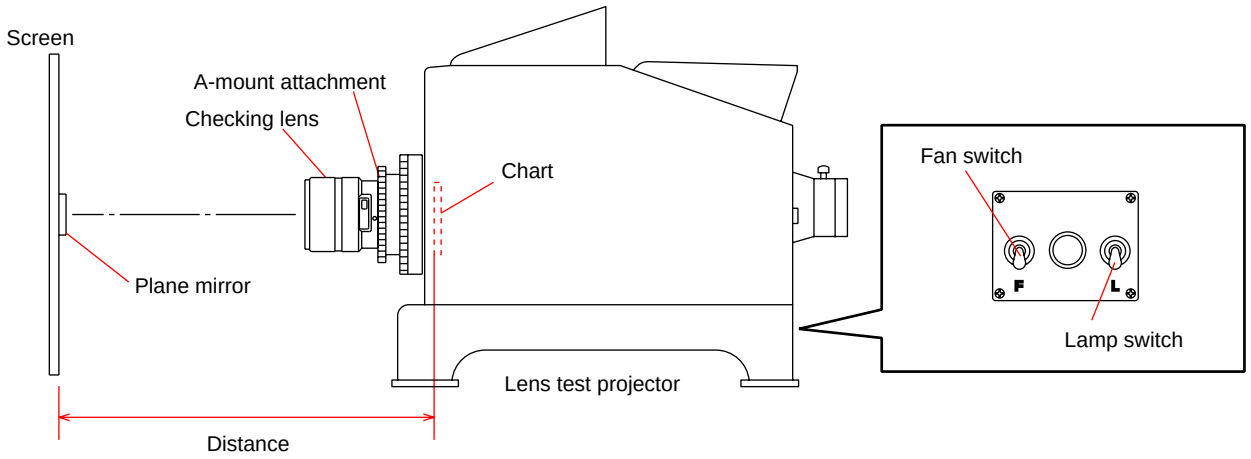


Fig.4-3-2

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).

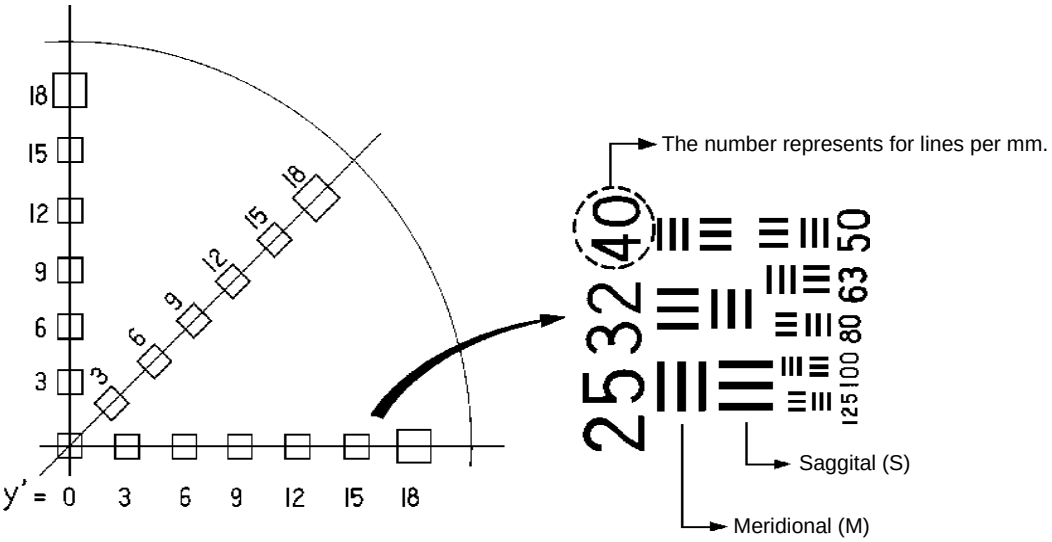


Fig.4-3-3

3) Turn the mount rotation ring of lens test projector until the projected image at a certain peripheral point (y'= 9 or 12) 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.

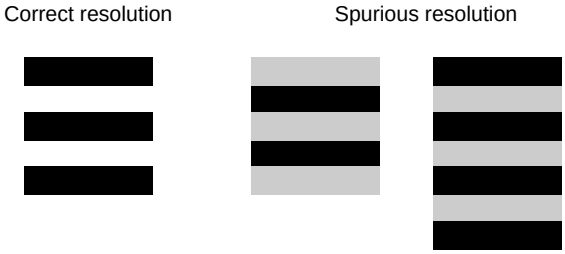


Fig.4-3-4

4) Change the focal-length (zoom) and distance of the checking lens, and check that the all readings (y'= 0, saggital (S) and meridional (M) at y'= 9 or 12) at each focal-length (zoom) and distance is within the specification of the Table 4-3-2.

Specification

Focal-length f (mm)	distance (m)	Number of the smallest pitched lines				
		Center (y'=0)	y'= 9		y'= 12	
		(Lines per mm)	S	M	S	M
18	0.84	125	50	40	40	32
35	1.49	125	50	40	40	32
70	2.82	80	40	25	40	20

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

4-4-1. Focus-shift/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.

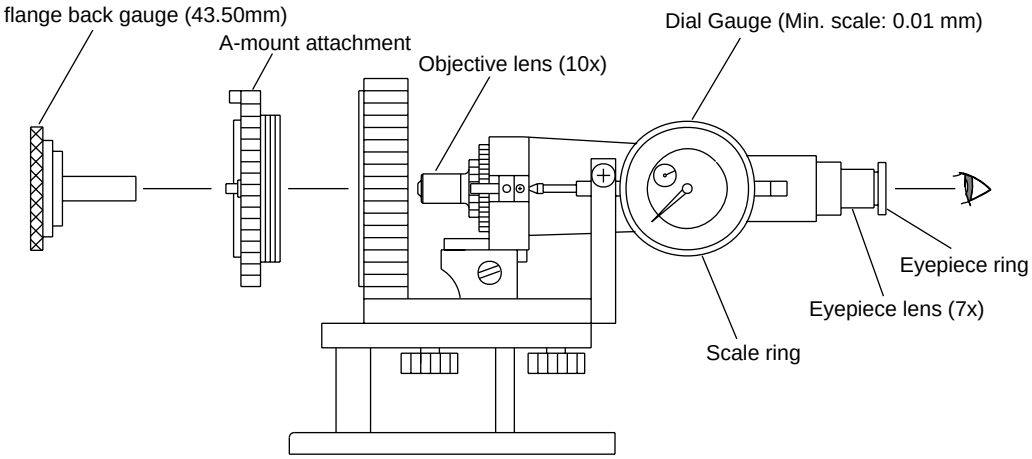


Fig.4-4-1

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.

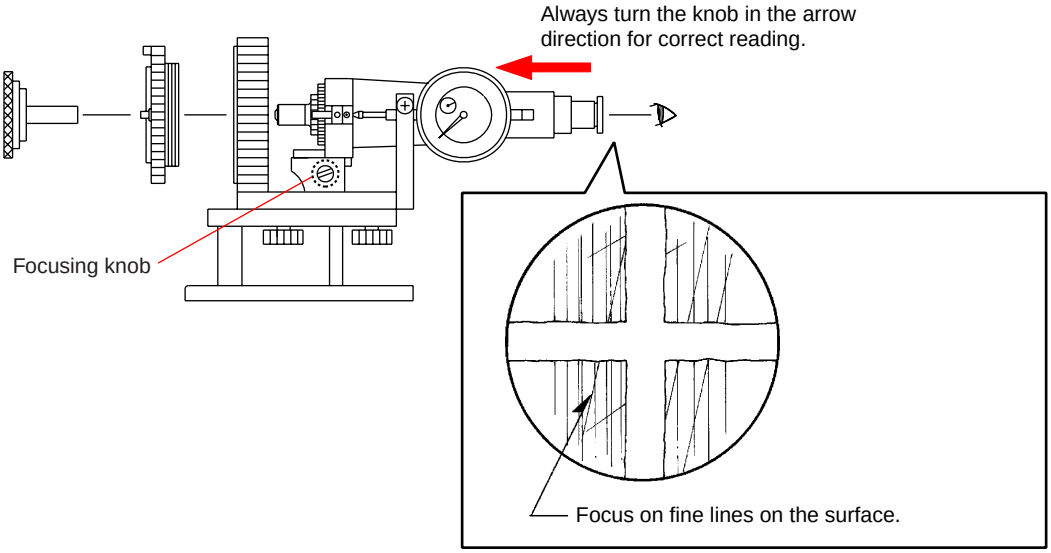


Fig.4-4-2

5) Turn the scale ring of the dial gauge until the long pointer indicates "0".
   Note: This position is the flange back (f'F) = 43.50 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.

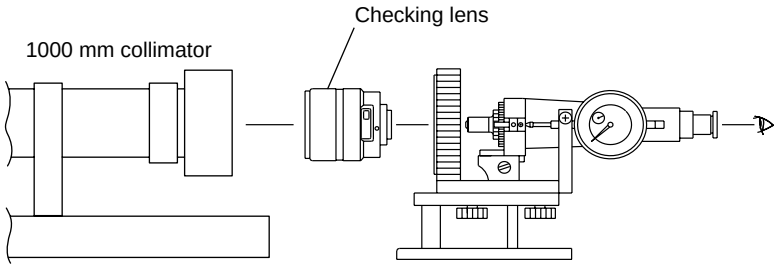


Fig.4-4-3

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.

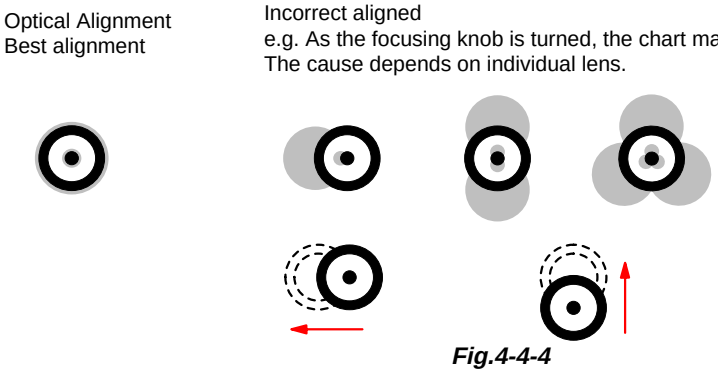


Fig.4-4-4

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.

Flange back (f'F) of the checking lens = (Flange back gauge) + (Number of short-pointer revolution) + (Reading of long-pointer)

Specification

Focal-length f (mm)	f'F (mm) (Infinity position)
18	44.65 to 44.85
70	46.33 to 46.63

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. Focus-shift/Flange Back (f'F) Adjustment".

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

Equipment

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

1. Preparations

1) Remove the zoom rubber ring.

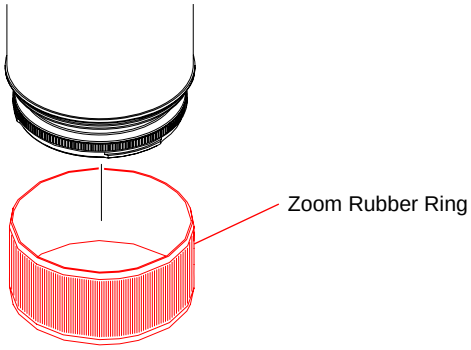


Fig.4-4-5

Adjusting Method

1) Turn the knob of the flange back tester, and set the dial gauge value to "46.48 mm" referring to "4-4-1. Focus-shift/Flange Back (f'F) Check".
2) Set the zoom ring of the checking lens to Tele end position (focal length: 70 mm).
3) Loosen the two screws fixing the focus stopper, and turn the focus ring so that the chart image is the sharpest. (Refer to Fig.4-4-6.)
4) Set the focus stopper until it stops in arrow direction while holding the focus ring, and tighten the two screws. (Refer to Fig.4-4-6.)

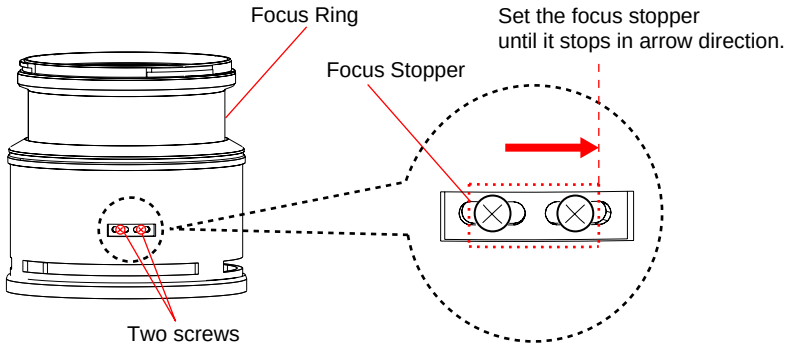


Fig.4-4-6

5) Set the zoom ring of the checking lens to Wide end position (focal length: 18 mm).
6) Turn the knob of the flange back tester until the chart image is the sharpest while looking through the microscope.
   This flange back (f'F) is f'w.
7) Calculate focus error amount using the following formula.

Focus error amount = Flange back (f'w) reading - 44.72 mm

Focus error amount: Amount that should be adjusted by the back adjustment washer thickness.
f'w: Flange back value (Reading value) at zoom ring is Wide end (focal length: 18 mm), and focus ring is position of step 4).

8) Adjust the back adjustment washer thickness according to the result of step 7). (Refer to Table 4-4-2 and Fig.4-4-7.)

Note: Use the micrometer gauge (or slide gauge) to measure the back adjustment washer thickness.

If focus error is a negative value: Decrease back adjustment washer thickness by error amount to increase flange back.
If focus error is a positive value: Increase back adjustment washer thickness by error amount to decrease flange back.

9) Change the coupler adjustment washer thickness to the back adjustment washer thickness. (Refer to Table 4-4-2 and Fig.4-4-7.)

Coupler adjustment washer thickness = Back adjustment washer thickness

Back adjustment washer	Parts No.	T (mm)
A	2-683-648-01	0.05
B	2-683-649-01	0.07
C	2-683-650-01	0.1
D	2-683-651-01	0.2
E	2-683-652-01	0.5

Coupler adjustment washer	Parts No.	T (mm)
A	2-683-641-01	0.05
B	2-683-642-01	0.07
C	2-683-643-01	0.1
D	2-683-644-01	0.2
E	2-683-645-01	0.5

Table 4-4-2

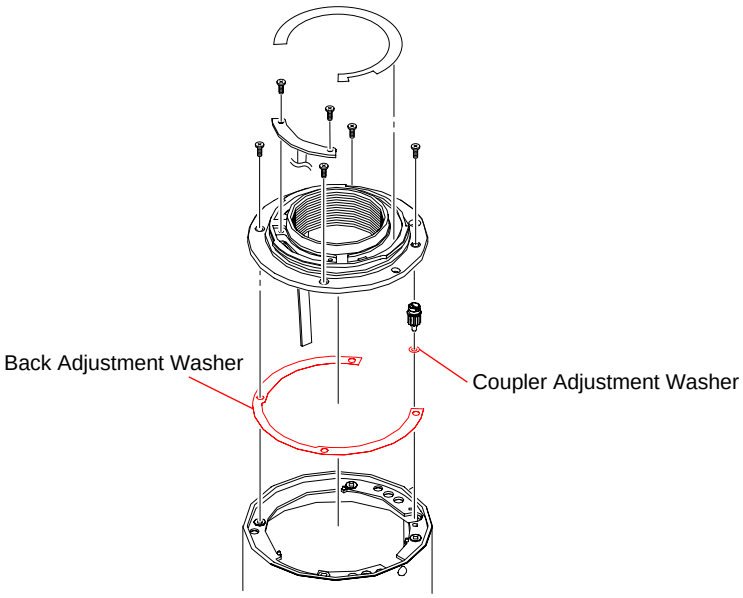


Fig.4-4-7

10) Install the back adjustment washer and coupler adjustment washer, and perform “4-4-1. Focus-shift/Flange Back (f’F) Check” again.
11) After the adjustment is completed, apply the adhesive bond (B-10) to the position shown in the Fig.4-4-8.

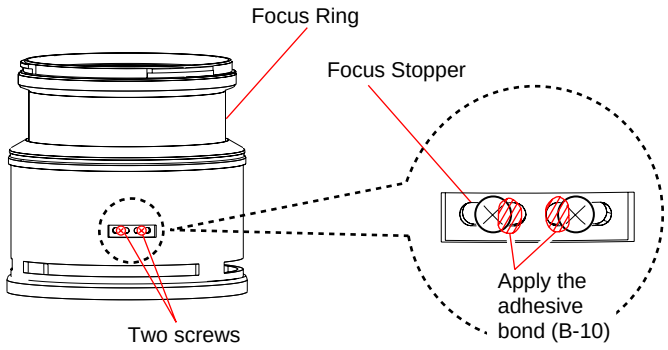


Fig.4-4-8

4-5. LENS ROM CHECK

Note: If dialog box of error code appears during the checking, check the reason of error referring to page 4-23.

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”.

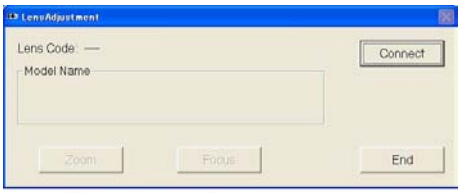


Fig. 4-5-1

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: Zoom and focus position setting is not required.

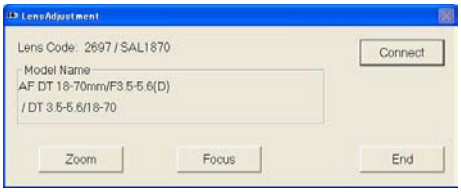


Fig. 4-5-2

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

4-6. ZOOM BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK

Note: If dialog box of error code appears during the checking or adjustment, check the reason of error referring to page 4-23.

4-6-1. Zoom Brush Position Check

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".

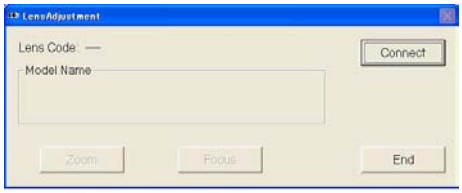


Fig. 4-6-1

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.

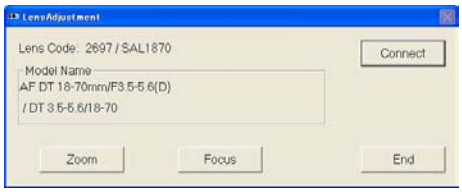


Fig. 4-6-2

2) Click the Zoom button on the lens adjustment program.
3) Set the zoom position to Tele end, and check that the OK (Green) indicator of "Position" lights as shown in Fig. 4-6-3.

Note: Lens focus position setting is not required.

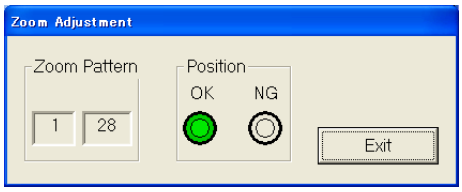


Fig. 4-6-3

If the NG (Red) indicator of "Position" lights, perform the "4-6-2. Zoom Brush Position Adjustment and Pattern Check".

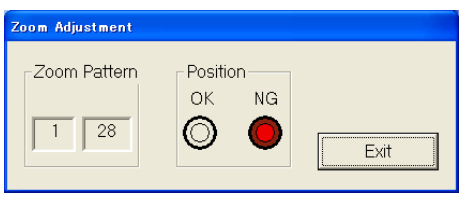


Fig. 4-6-4

4) Click the Exit button.
5) Click the End button to terminate the lens adjustment program.
6) Turn the POWER switch of the camera to OFF.

4-6-2. Zoom Brush Position Adjustment and Pattern Check

Equipment

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

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

- Zoom Barrel Holder Jig

  Note: For details of the jig making method, refer to “4-1-1. List of Service Tools and Equipments”.

1. Preparations

1) Attach the zoom barrel holder jig to the checking lens and assemble the lens.

2. Zoom Brush Position Adjustment

1) Set the zoom position to Tele end.
2) Remove the polyester tape (black) 10mm as shown in Fig. 4-6-5.

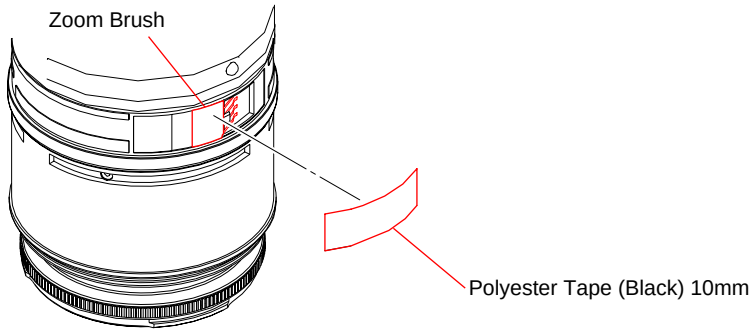


Fig. 4-6-5

3) Perform the “4-6-1. Zoom Brush Position Check”, and adjust the zoom brush position until the OK (Green) indicator of “Position” lights.

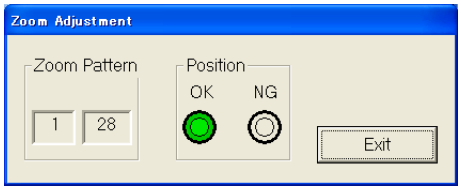


Fig. 4-6-6

4) Fix the zoom brush with the polyester tape (black) 10mm as shown in Fig. 4-6-5.

3. Pattern Check

Note: When the NG (Red) indicator of “Position” lights during checking, does not care about it (It is normal performance).

1) Turn the zoom ring slowly from the Tele end “Zoom Pattern : 1” to Wide end “Zoom Pattern : 28” and check that the value of “Zoom Pattern” change from 1 to 28 continuously.

2) Turn the zoom ring slowly from Wide end (Zoom Pattern : 28) to the Tele end (Zoom Pattern : 1) and check that the value of “Zoom Pattern” change from 28 to 1 continuously.

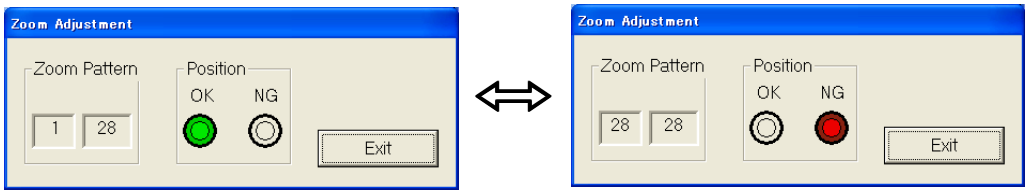


Fig. 4-6-7

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

4-7. FOCUS BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK

Note: If dialog box of error code appears during the checking or adjustment, check the reason of error referring to page 4-23.

4-7-1. Focus Brush Position Check

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”.

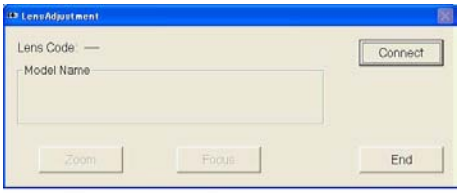


Fig. 4-7-1

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.

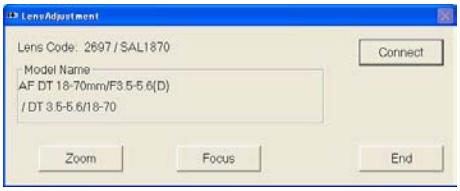


Fig. 4-7-2

2) Click the Focus button on the lens adjustment program.
3) Set the zoom position to Tele end and the focus position to infinity end, then check that the OK (Green) indicator of “Position” lights as shown in Fig. 4-7-3.

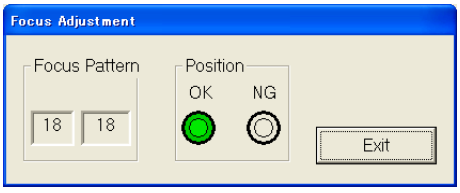


Fig. 4-7-3

If the NG (Red) indicator of “Position” lights, perform the “4-7-2. Focus Brush Position Adjustment and Pattern Check”.

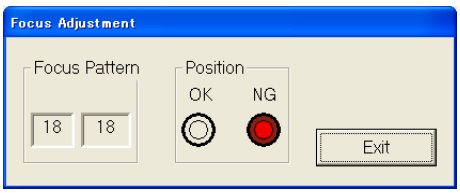


Fig. 4-7-4

4) Click the Exit button.
5) Click the End button to terminate the lens adjustment program.
6) Turn the POWER switch of the camera to OFF.

4-7-2. Focus Brush Position Adjustment and Pattern Check

Equipment

- Personal Computer (PC)
- Camera DSLR-A100
- USB Cord With Connector
- Adhesive bond (B-10)
- Lens Adjustment Program

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

- Zoom Barrel Holder Jig

  Note: For details of the jig making method, refer to “4-1-1. List of Service Tools and Equipments”.

1. Preparations

1) Attach the zoom barrel holder jig to the checking lens and assemble the lens.

2. Focus Brush Position Adjustment

1) Set the focus position to infinity end.
2) Loosen the two screws fixing the focus brush.

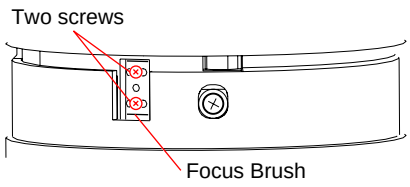


Fig. 4-7-5

3) Perform the “4-7-1. Focus Brush Position Check”, and adjust the focus brush position until the OK (Green) indicator of “Position” lights.

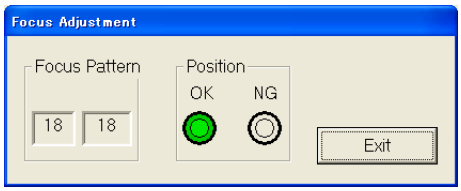


Fig. 4-7-6

4) Tighten the two screws loosened in step 2).

3. Pattern Check

Note: When the NG (Red) indicator of “Position” lights during checking, does not care about it (It is normal performance).

1) Turn the focus ring slowly from the near end “Focus Pattern : 1” to the infinity end “Focus Pattern : 18” and check that the value of “Focus Pattern” change from 1 to 18 continuously.

2) Turn the focus ring slowly from the infinity end “Focus Pattern : 18” to the near end “Focus Pattern : 1” and check that the value of “Focus Pattern” change from 18 to 1 continuously.

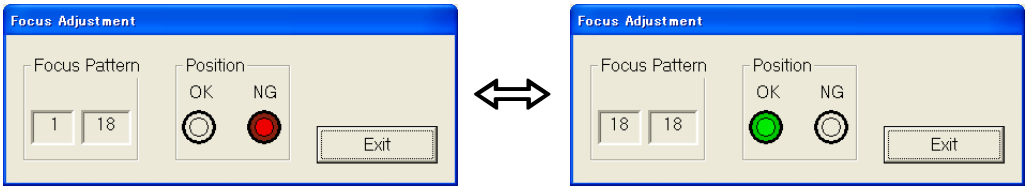


Fig. 4-7-7

3) Click the Exit button.
4) Click the End button to terminate the lens adjustment program.
5) Turn the POWER switch of the camera to OFF.
6) After the pattern check is completed, apply the adhesive bond (B-10) as shown in Fig. 4-7-8.

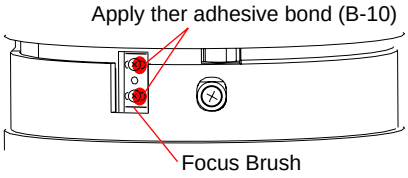


Fig. 4-7-8

4-8. 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

SAL1870

(3.5-5.6/18-70) (DT 18-70mm F3.5-5.6)

SONY

SERVICE MANUAL

Ver. 1.3 2007.08

US Model
Canadian Model
AEP Model
Chinese Model

SUPPLEMENT-1

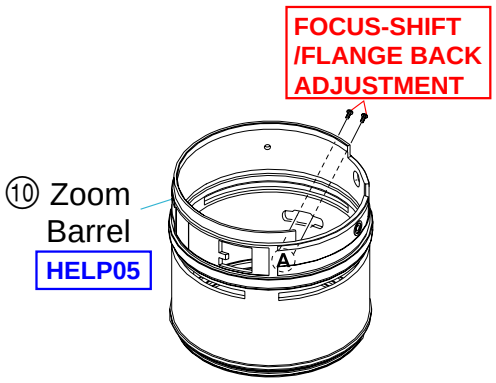
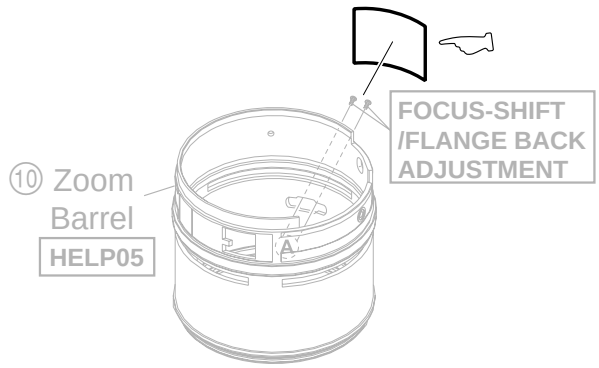
File this supplement with the service manual.

(DI07-053)

- **Addition of Repair Parts**
- **Correction of error in writing**

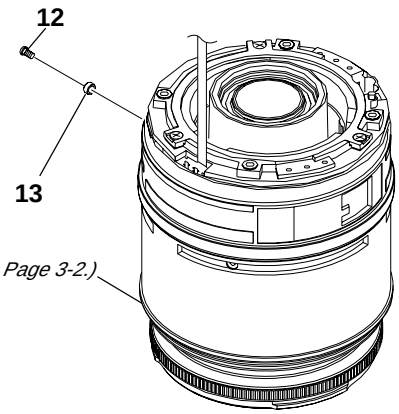
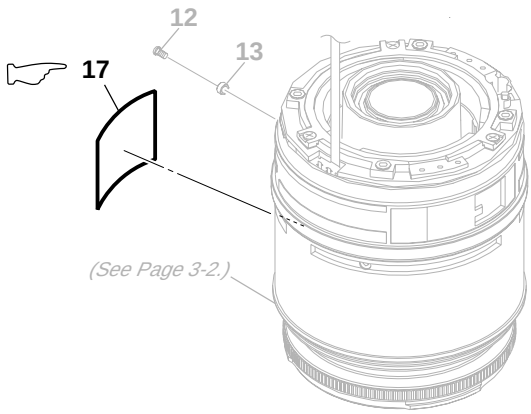
2-1-2. GEAR BARREL, ZOOM CAM BARREL AND ZOOM CONTROL TUBE BLOCK

☞ : Points added portion.

Page	Before change	After change
2-3		

3-1-1. LENS MOUNT BLOCK AND ZOOM RETAINER TUBE BLOCK

☞ : Points added portion.

Page	Before change	After change
3-1		

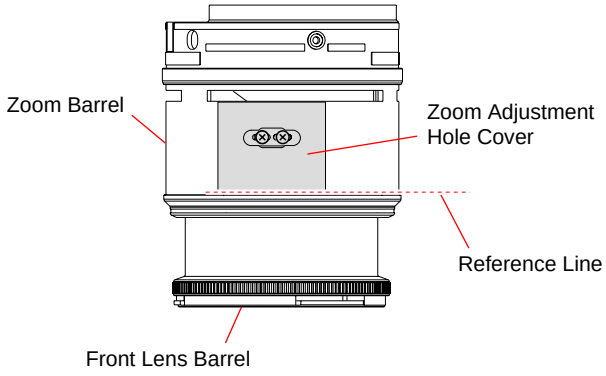
Before change:

Ref. No.	Part No.	Description
——	————	————————

After change:

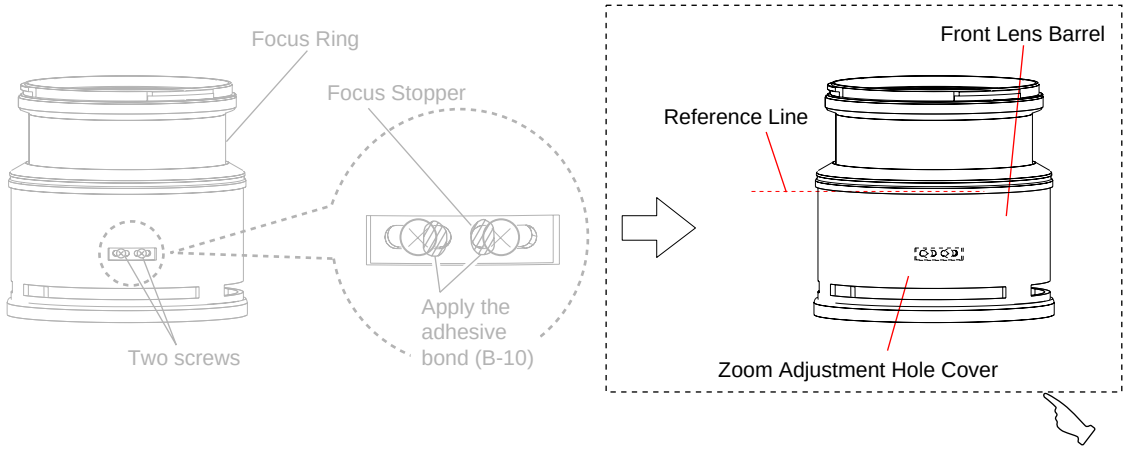
Ref. No.	Part No.	Description
17	2-898-231-01	COVER, ZOOM ADJUSTMENT HOLE

HELP07

Added contents
9. Attach the zoom adjustment hole cover to the zoom barrel as shown in figure. 

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

: Points added portion.

Page	Added contents
4-15	12) Attach the zoom adjustment hole cover to the zoom barrel as shown in figure. 

- **Correction of error in writing**

3-1-3. ZOOM CONTROL TUBE BLOCK

: Points changed portion.

Page	Incorrect			Correct		
	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
3-3	107	9-913-210-00	POLYESTER TAPE (Note 1)	* 107	9-913-210-00	POLYESTER TAPE (Note 1)

SAL1870

(3.5-5.6/18-70) (DT 18-70mm F3.5-5.6)

SONY

SERVICE MANUAL

Ver. 1.5 2008.04

US Model
Canadian Model
AEP Model
Chinese Model

SUPPLEMENT-2

File this supplement with the service manual.

(DI08-032)

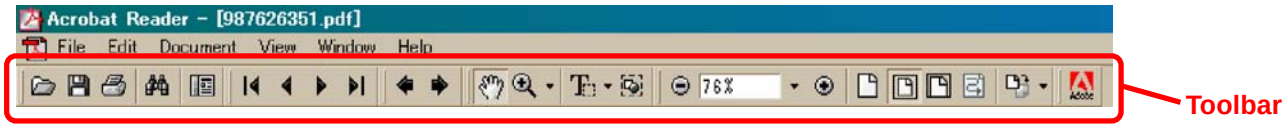
• Addition of Repair Parts for color variation "CHAMPAGNE GOLD"

3-1. EXPLODED VIEWS

☞ : Points added portion.

Page	Before change	After change
3-1	**3-1-1. LENS MOUNT BLOCK AND ZOOM RETAINER TUBE BLOCK** Ref. No. / Part No. / Description 9 / A-1189-526-A / BLOCK, ZOOM RETAINER TUBE	**3-1-1. LENS MOUNT BLOCK AND ZOOM RETAINER TUBE BLOCK** Ref. No. / Part No. / Description 9 / A-1189-526-A / BLOCK, ZOOM RETAINER TUBE (BLACK) 9 / A-1546-859-A / BLOCK, ZOOM RETAINER TUBE (CHAMPAGNE GOLD)
3-3	**3-1-3. ZOOM CONTROL TUBE BLOCK** Ref. No. / Part No. / Description 101 / A-1189-523-A / BLOCK, ZOOM CONTROL TUBE 104 / 2-683-681-01 / ZOOM BARREL 106 / 2-683-614-01 / BLACK DECORATION LINE	**3-1-3. ZOOM CONTROL TUBE BLOCK** Ref. No. / Part No. / Description 101 / A-1189-523-A / BLOCK, ZOOM CONTROL TUBE (BLACK) 101 / A-1546-860-A / BLOCK, ZOOM CONTROL TUBE (CHAMPAGNE GOLD) 104 / 2-683-681-01 / ZOOM BARREL (BLACK) 104 / 3-876-937-01 / ZOOM BARREL (CHAMPAGNE GOLD) 106 / 2-683-614-01 / BLACK DECORATION LINE (BLACK) 106 / 3-876-938-01 / SILVER DECORATION LINE (CHAMPAGNE GOLD)

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



Printing a text

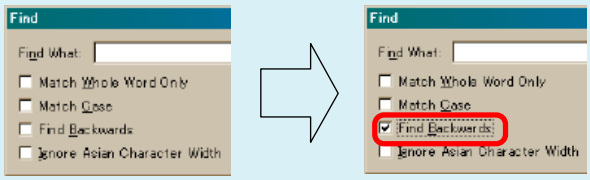
1. Click the Print button .
2. Specify a printer, print range, number of copies, and other options, and then click [OK].

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.

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.

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 .

Reversing the screens displayed once

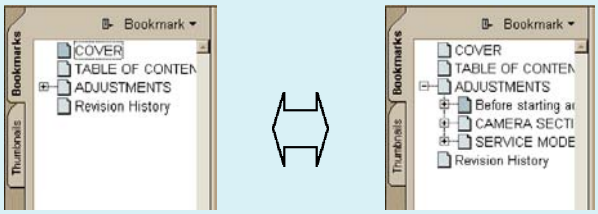
- To reverse the previous screens (operation) one by one, click the .
- To advance the reversed screens (operation) one by one, click the .

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.

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.

Revision History

Ver.	Date	History	Contents	S.M. Rev. issued
1.0	2006.06	Official Release	—	—
1.1	2007.02	Revised-1	• Change of Repair Parts (Section 1-5, Section 2, Section 3, Section 4) • Addition of guide of [About the Lens Test Projector] (Cover)	Yes
1.2	2007.05	Correction-1 (C-1)	• Correction of Repair Parts S.M. Correction: Page 2-4, 3-4	Yes
1.3	2007.08	Supplement-1 (DI07-053)	• Addition of Repair Parts • Correction of error in writing S.M. Correction: Page 3-3	Yes
1.4	2008.01	Revised-2	• Correction of Aperture Diameter Check (Page 4-4, 4-6)	Yes
1.5	2008.04	Supplement-2 (DI08-032)	• Addition of Repair Parts for color variation “CHAMPAGNE GOLD” • Change of Repair Parts for supplied accessories S.M. Revision: Page 3-6	Yes