

SAL1680Z

(Vario-Sonnar DT 3.5-4.5/16-80 ZA) (Vario-Sonnar T* DT 16-80mm F3.5-4.5 ZA)

SERVICE MANUAL

Ver. 1.5 2008.09

Revision History

How to use
Acrobat Reader

Revised-3

Replace the previously issued
SERVICE MANUAL 9-852-120-13
with this Manual.



*US Model
Canadian Model
AEP Model
Chinese Model*

Link

• SPECIFICATIONS

• DISASSEMBLY

• ADJUSTMENTS

• SERVICE NOTE

• REPAIR PARTS LIST

- [About the Lens Test Projector and Finished Inspection JIG](#)
- [About the Front Decoration Plate](#)
- [About the MTF measurement](#)

LENS FOR DSLR CAMERA

SONY®



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)

24-120

*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

10-14

Angle of view *2

83°-20°

*2 The value of angle of view is based on Digital Single Lens Reflex Cameras equipped with an APS-C sized image sensor.

Minimum focus (m (feet)) *3

0.35 (1.2)

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

Maximum magnification (×)

0.24

Minimum f-stop

f/22-29

Filter diameter (mm)

62

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

Approx. 72 × 83 (2 7/8 × 3 3/8)

Mass (g (oz.))

Approx. 445 (15 3/4)

Included items

Lens (1), Front lens cap (1), Rear lens cap (1), Lens hood (1), Lens case (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.)



Be careful to the following points to solder or unsolder.

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

1-4. SAFETY CHECK-OUT



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

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


CAUTION

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

SAFETY-RELATED COMPONENT WARNING!!

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

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

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

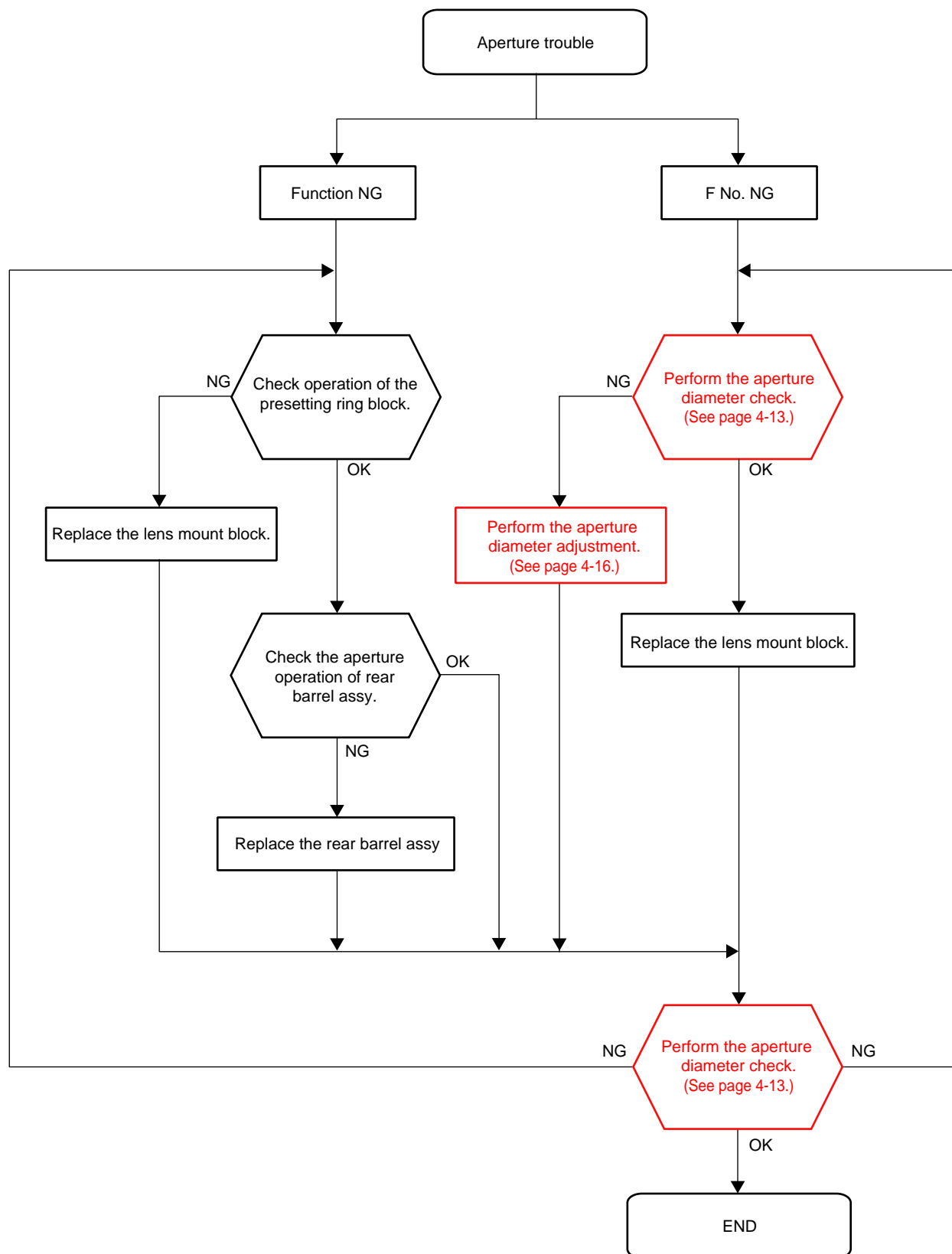
1-5. MTF Measurement

In case of replacement or disassembling the effective parts against performance, be sure to perform MTF measurement.

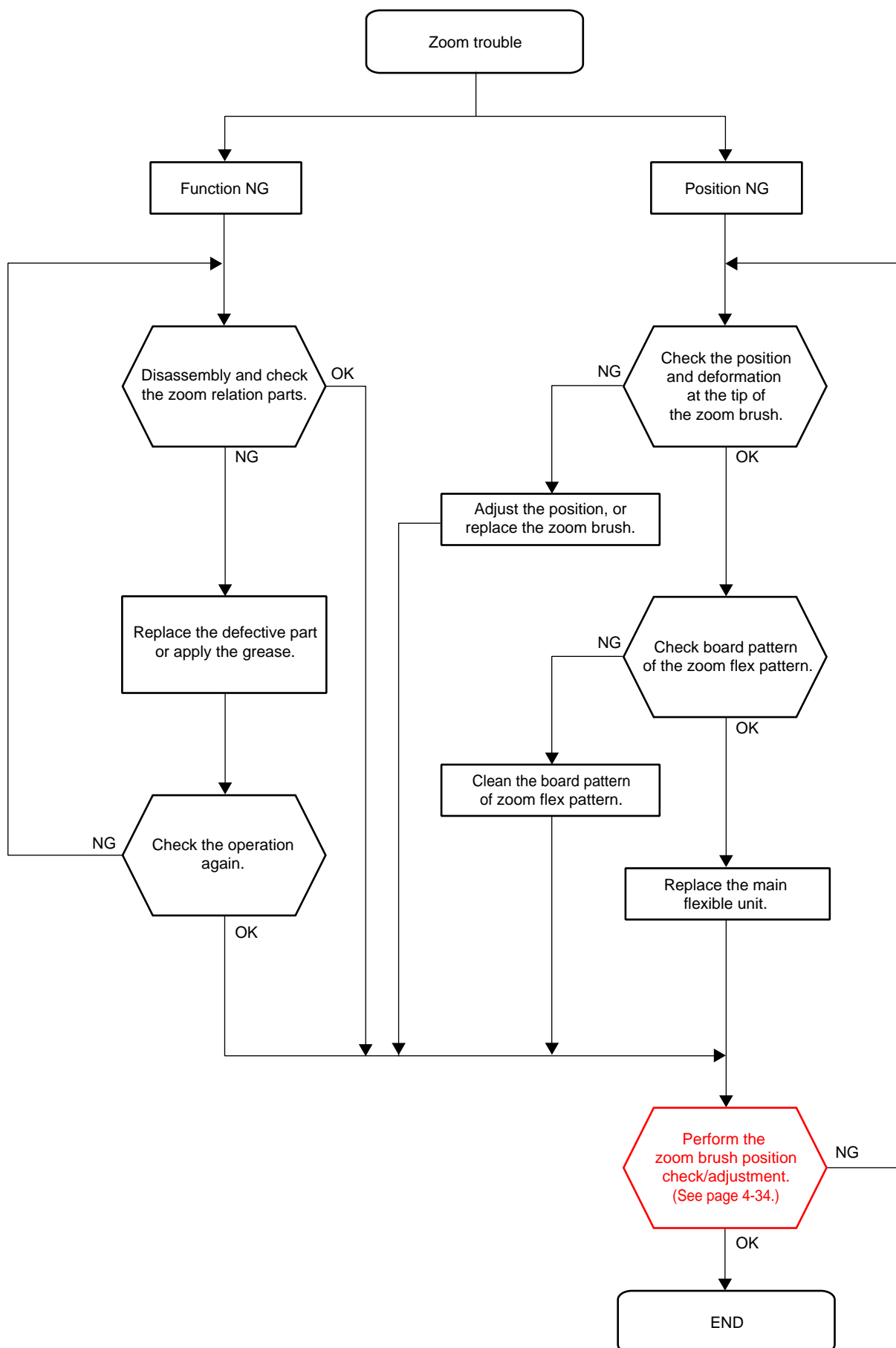
Please consult a related headquarters about service information.

1-6. TROUBLESHOOTING

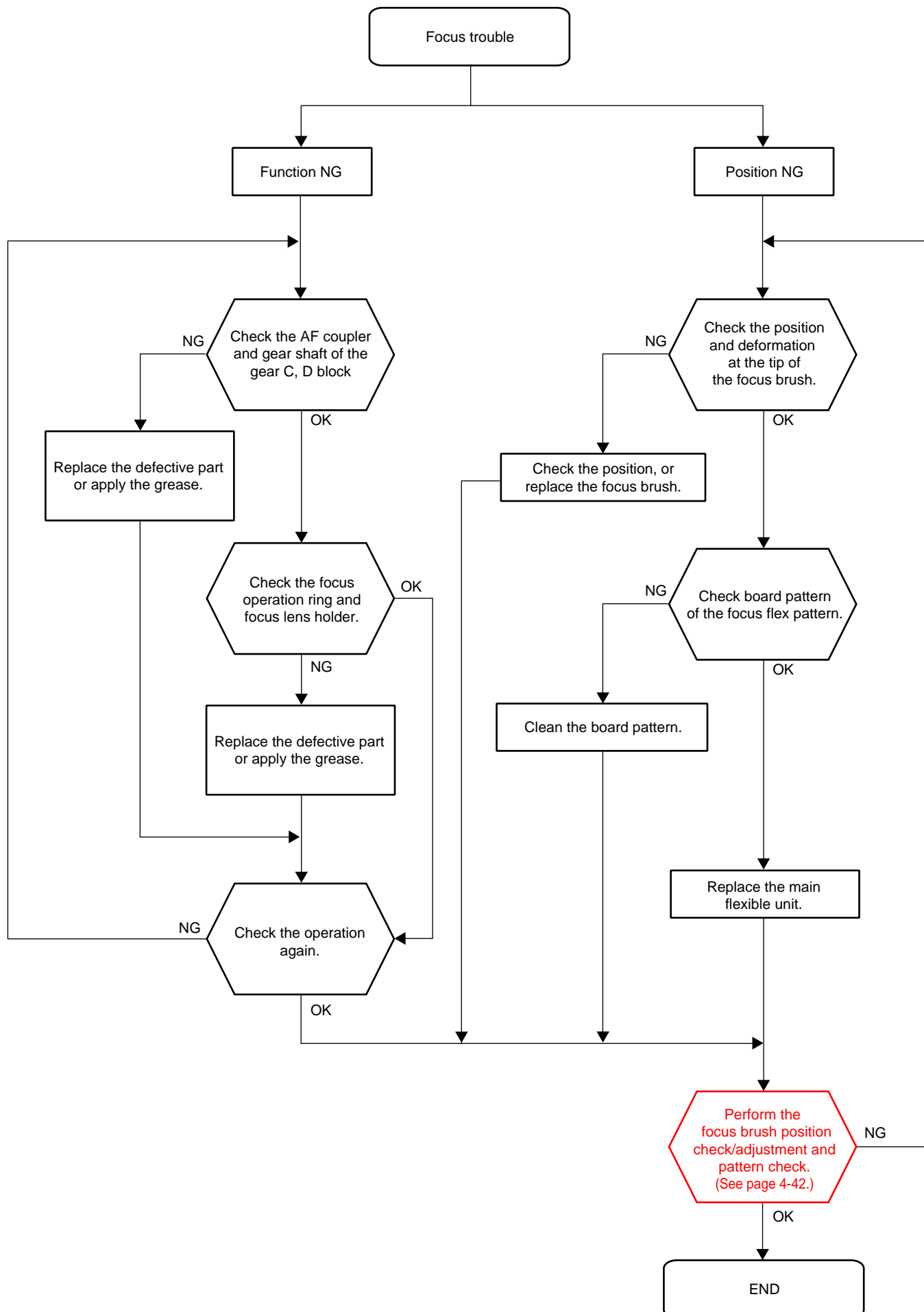
1-6-1. Aperture Trouble



1-6-2. Zoom Trouble



1-6-3. Focus Trouble

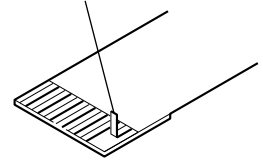


2. DISASSEMBLY

NOTE FOR REPAIR

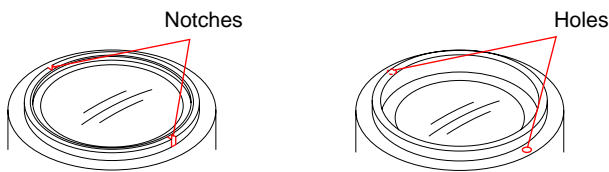
- Make sure that the flat cable and flexible board are not cracked or bent at the terminal. Do not insert the cable insufficiently nor crookedly.
- When remove a connector, don't pull at wire of connector. It is possible that a wire is snapped.
- When installing a connector, don't press down at wire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

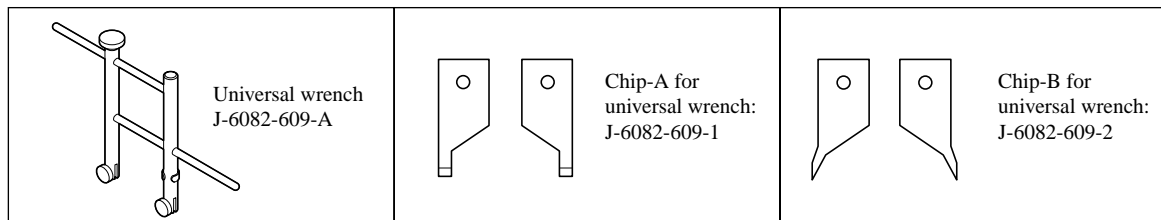


UNIVERSAL WRENCH

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

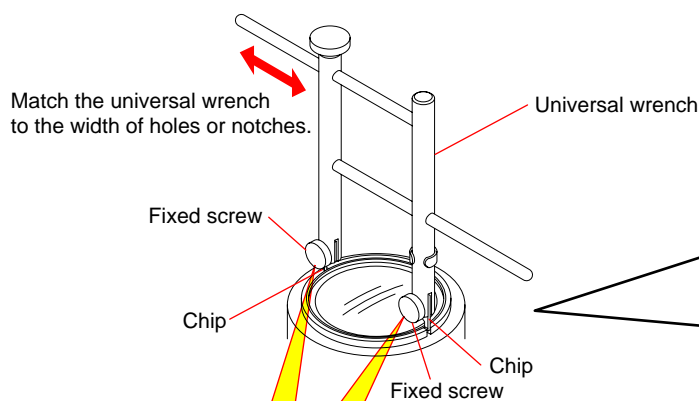


Attach the chip-A or chip-B to the universal wrench.

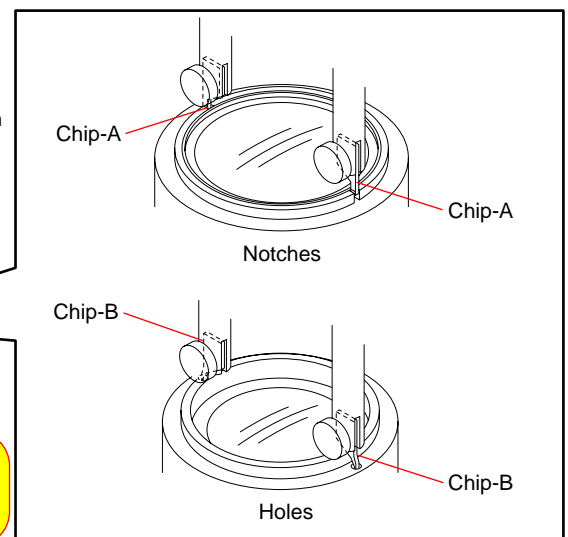
For the notches: chip-A

For the holes: chip-B

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



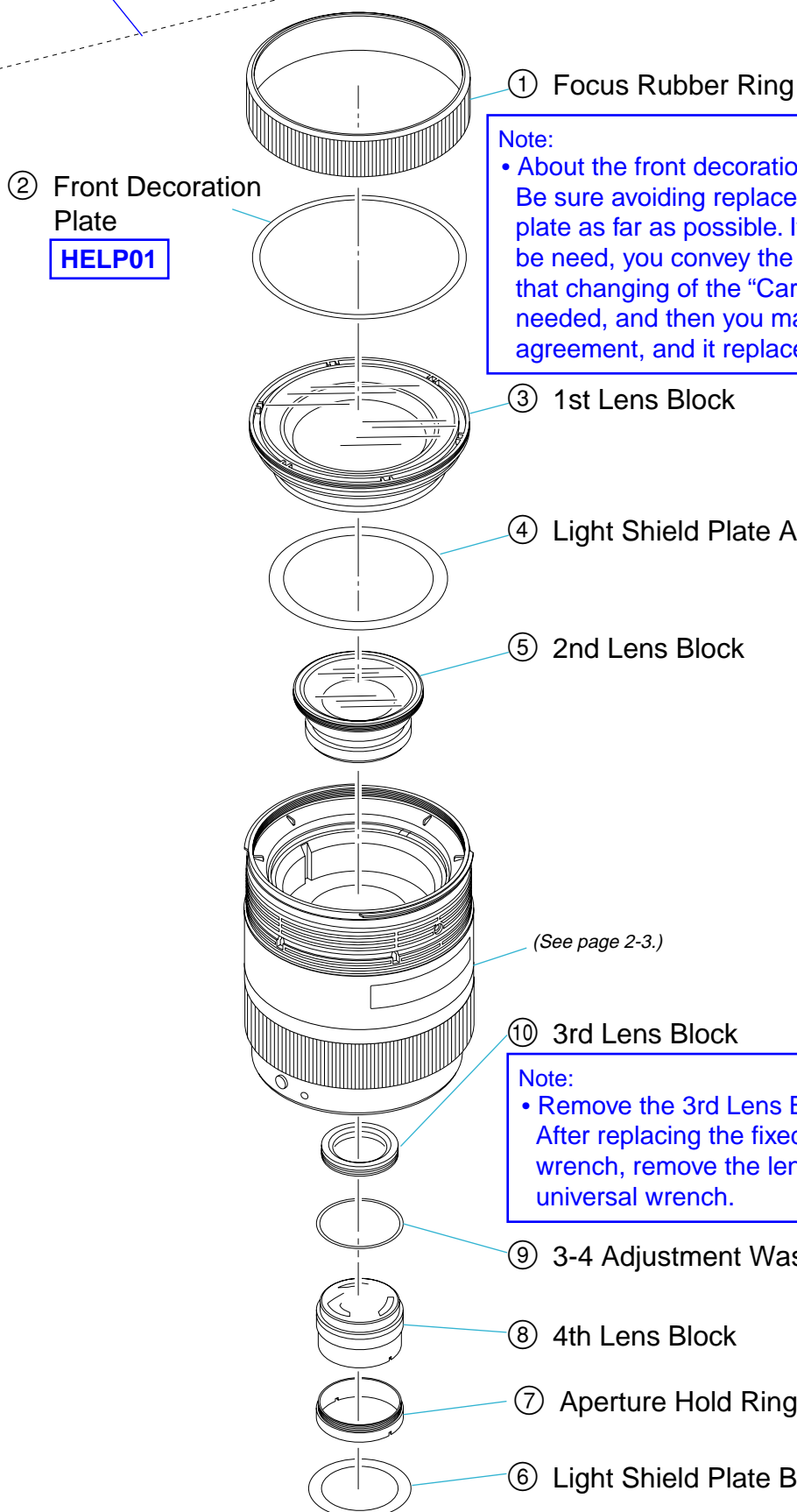
When top of tip does not reach holes or notches because the fixed screw becomes obstructive, replace the fixed screw to below.
+B 3X5 7-682-546-09



2-1. DISASSEMBLY

2-1-1. LENS BLOCK

EXPLODED VIEW



Note:

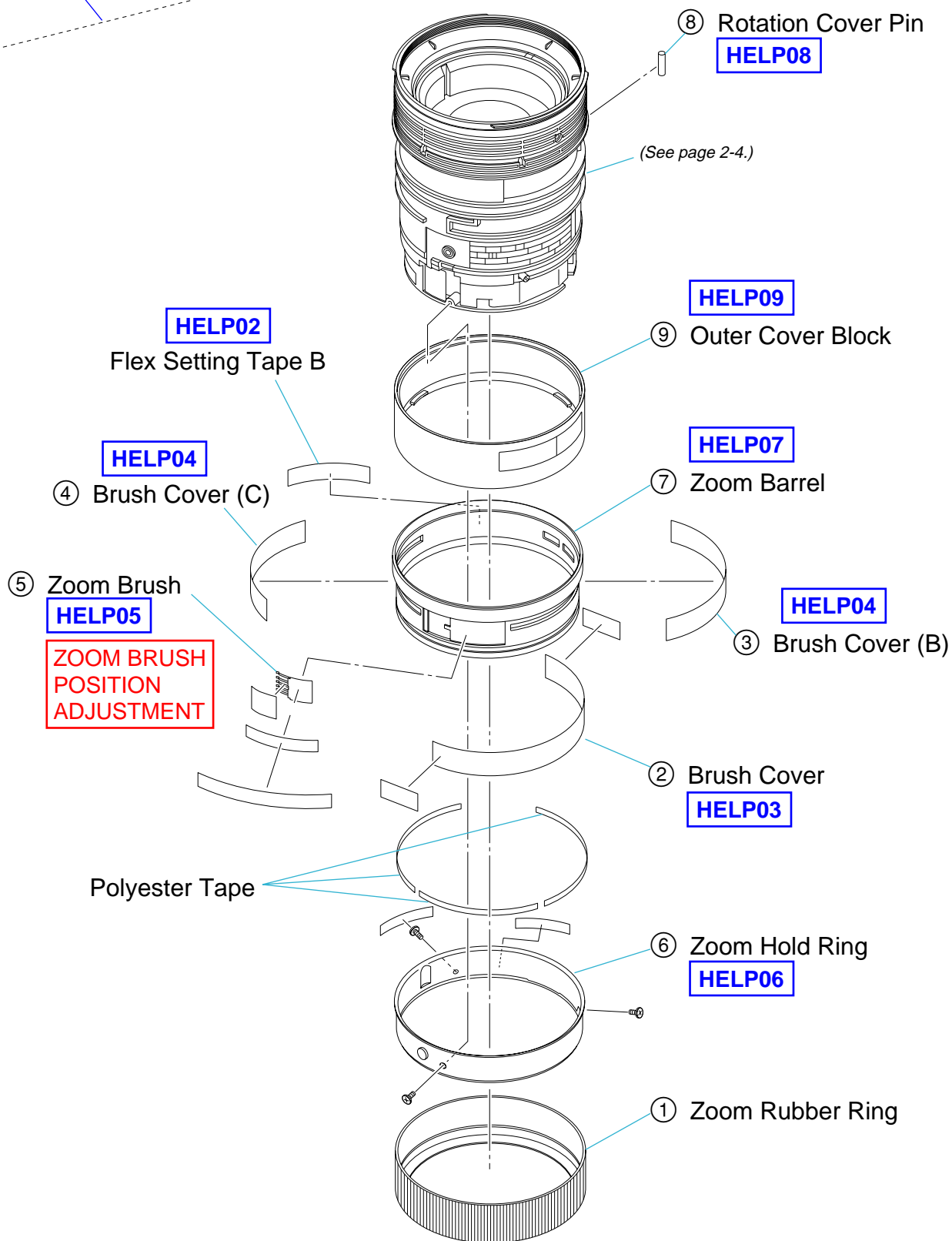
- About the front decoration plate :
Be sure avoiding replacement of front decoration plate as far as possible. If replacement of it should be need, you convey the message to your user that changing of the "Carl Zeiss Serial No." is needed, and then you may obtain user's agreement, and it replace.

Note:

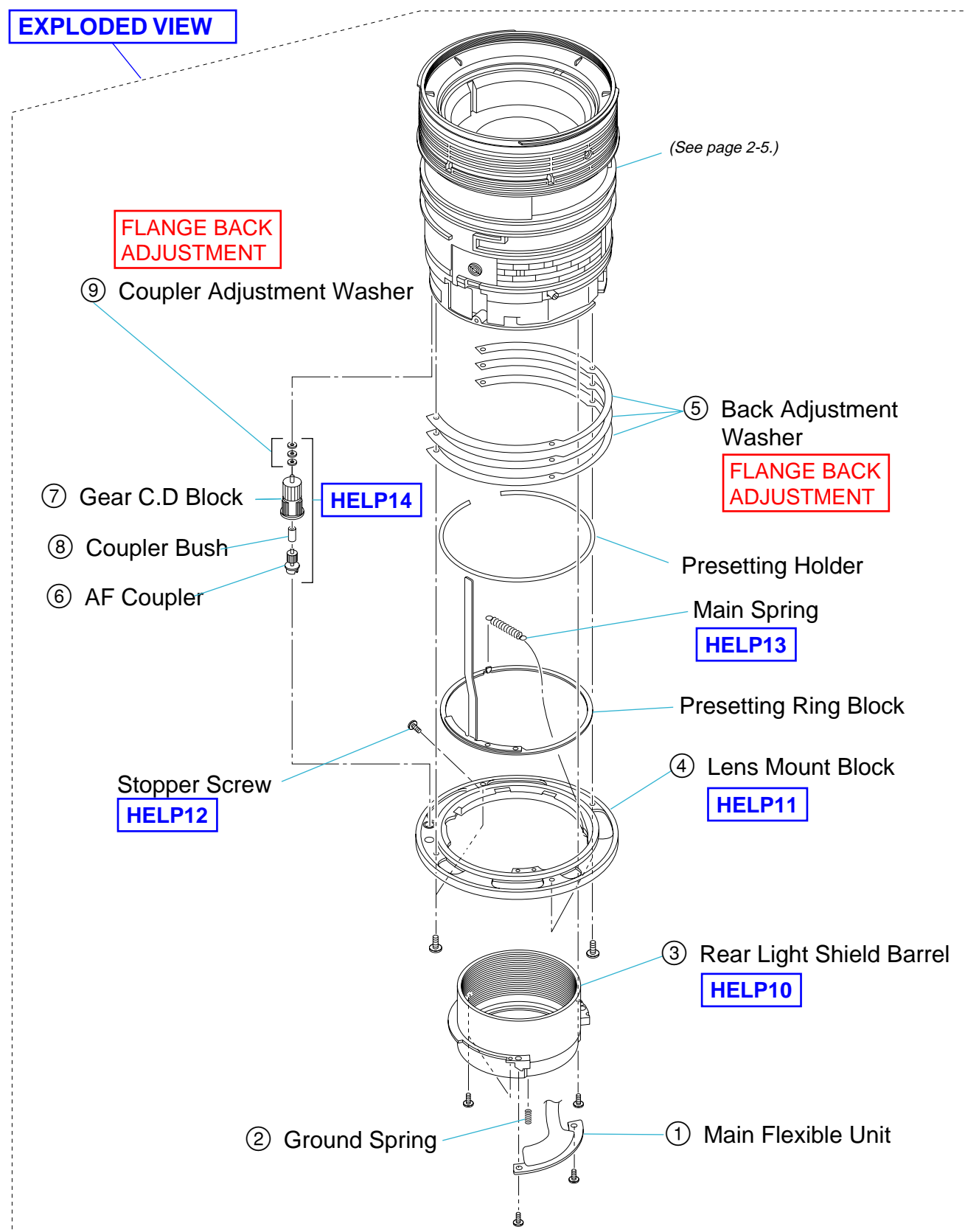
- Remove the 3rd Lens Block :
After replacing the fixed screw of universal wrench, remove the lens block using the universal wrench.

2-1-2. ZOOM BRUSH, ZOOM BARREL AND OUTER COVER BLOCK

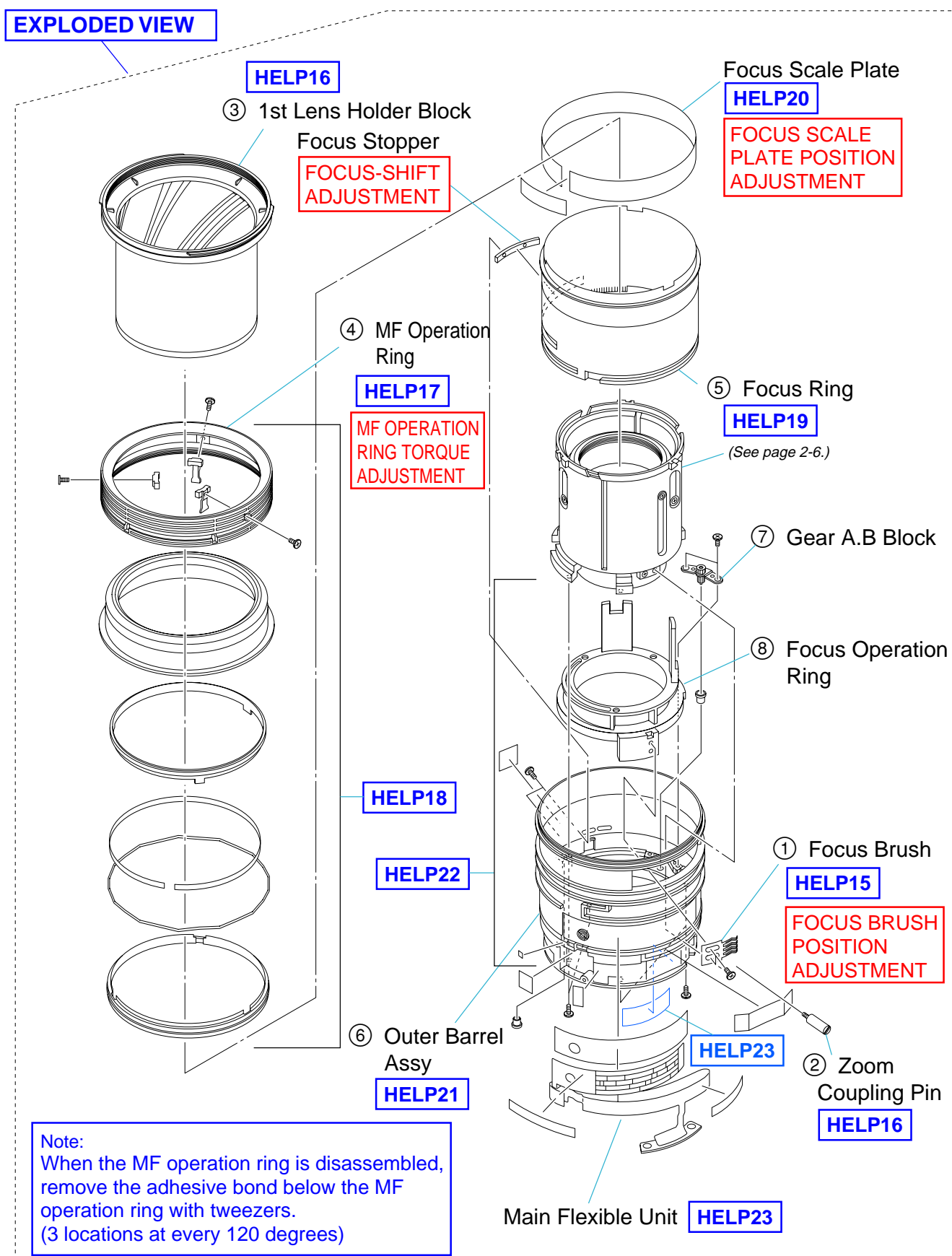
EXPLODED VIEW



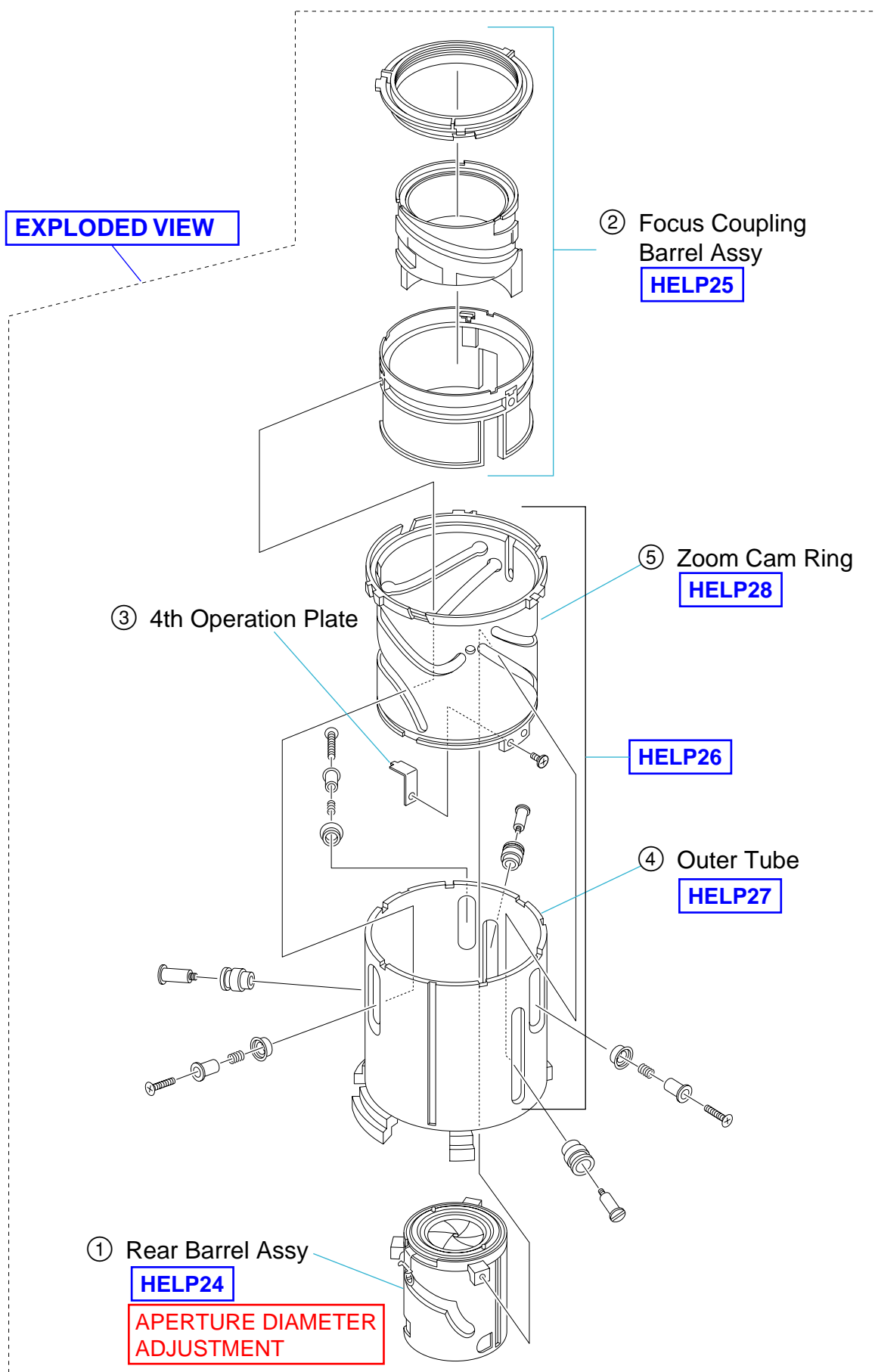
2-1-3. LENS MOUNT BLOCK



2-1-4. MAIN FLEXIBLE UNIT, FOCUS RING AND MF OPERATION RING



2-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY



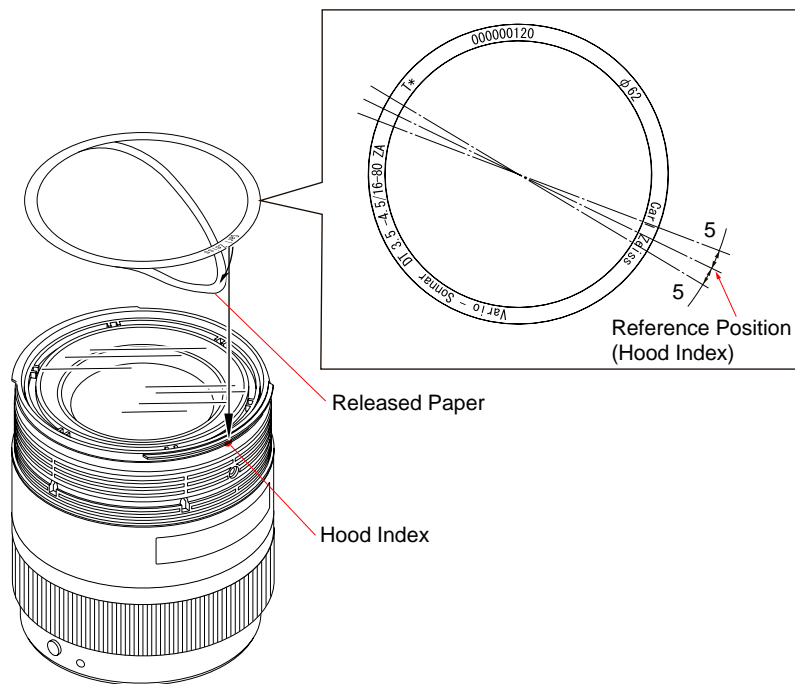
HELP

Note for assembling and grease applying positions are shown.

HELP01

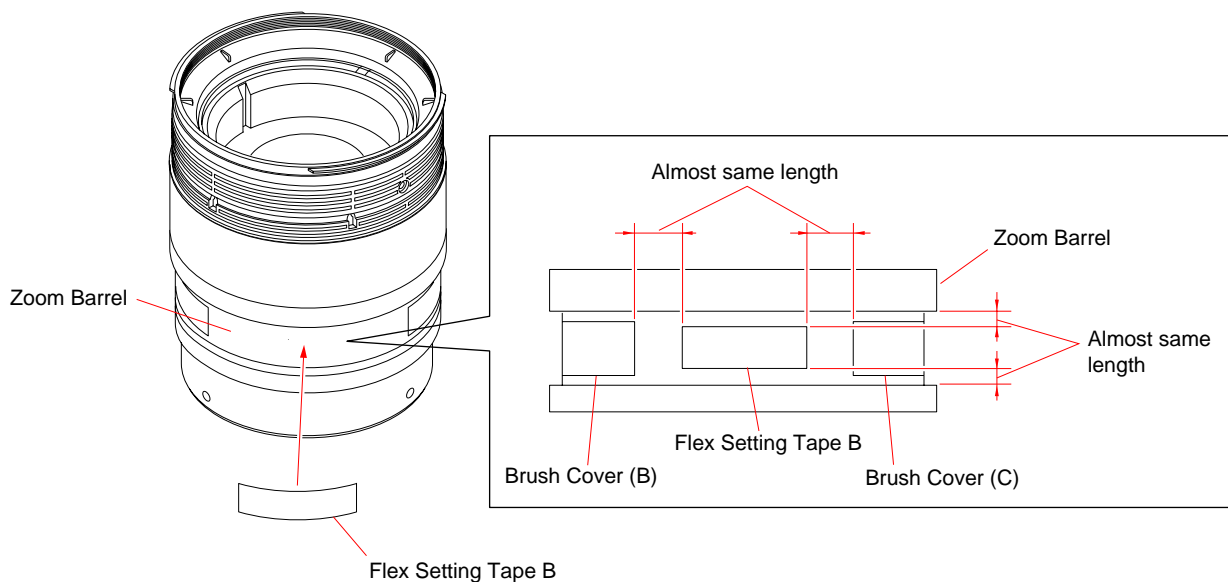
Peel the released paper from the front decoration plate and affix the front decoration plate, aligning the top of “Z” of “Carl Zeiss” shown in the figure with the hood index.

Note: When affixing, be careful not to damage the decorated side of front decoration plate.



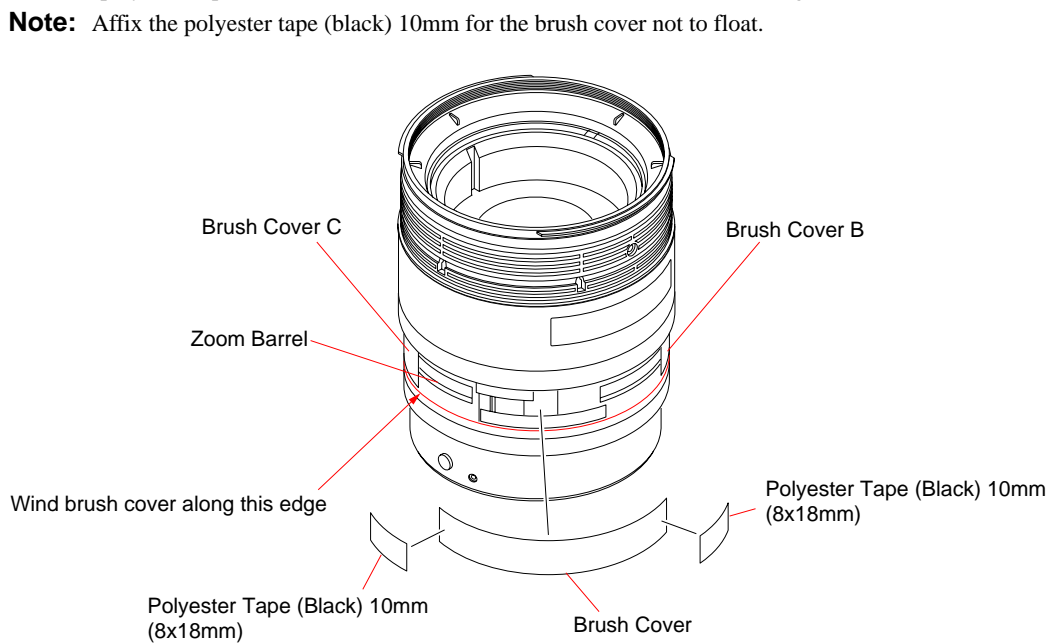
HELP02

Affix the flex setting tape B evenly between the brush cover (B) and the brush cover (C).



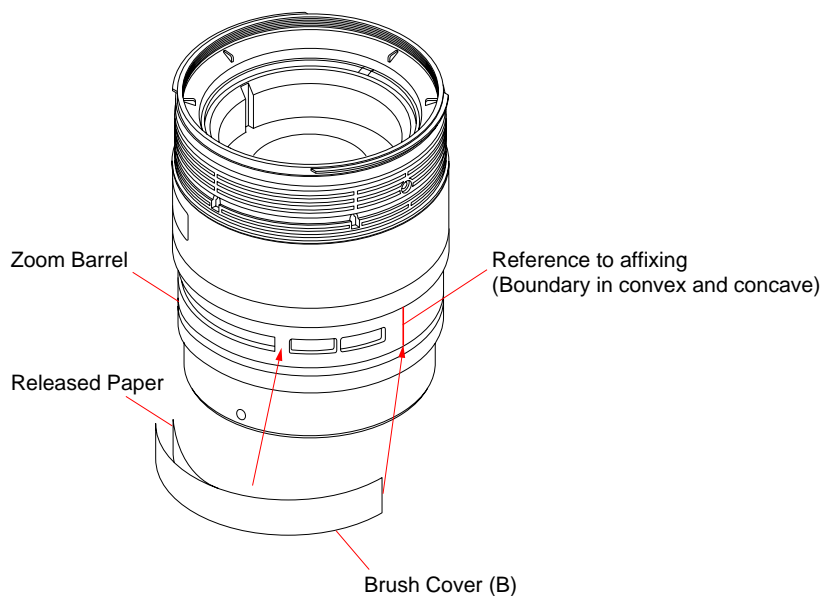
HELP03

1. Do not pile up the brush cover to brush cover (B) and brush cover (C), and wind the lower end of brush cover along the edge of zoom barrel.
2. Affix the polyester tape (black) 10mm cut as instructed to the location shown in figure.

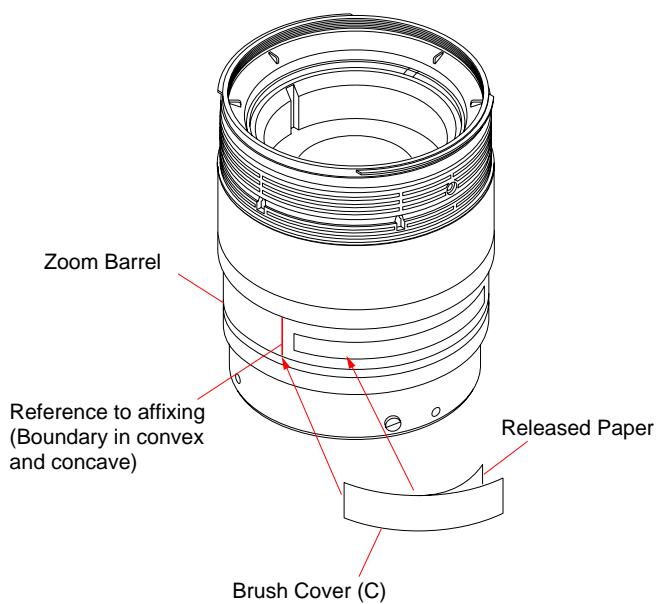


HELP04

1. Peel the released paper from the brush cover (B) and affix it to the concave side of zoom barrel as shown in the figure, referring the boundary in concave and convex sides as a reference.

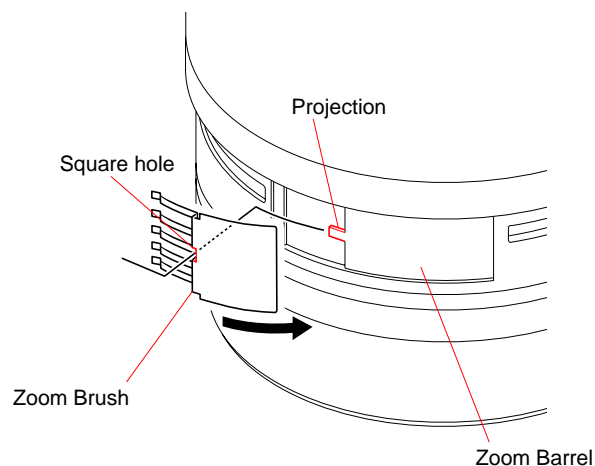


2. Likewise, peel the released paper from the brush cover (C) and affix it to the concave side of zoom barrel as shown in the figure, referring the boundary in concave and convex sides as a reference.

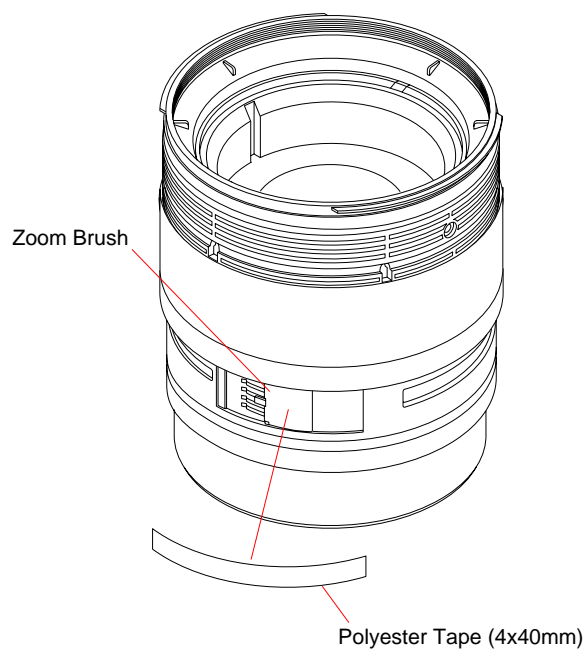


HELP05

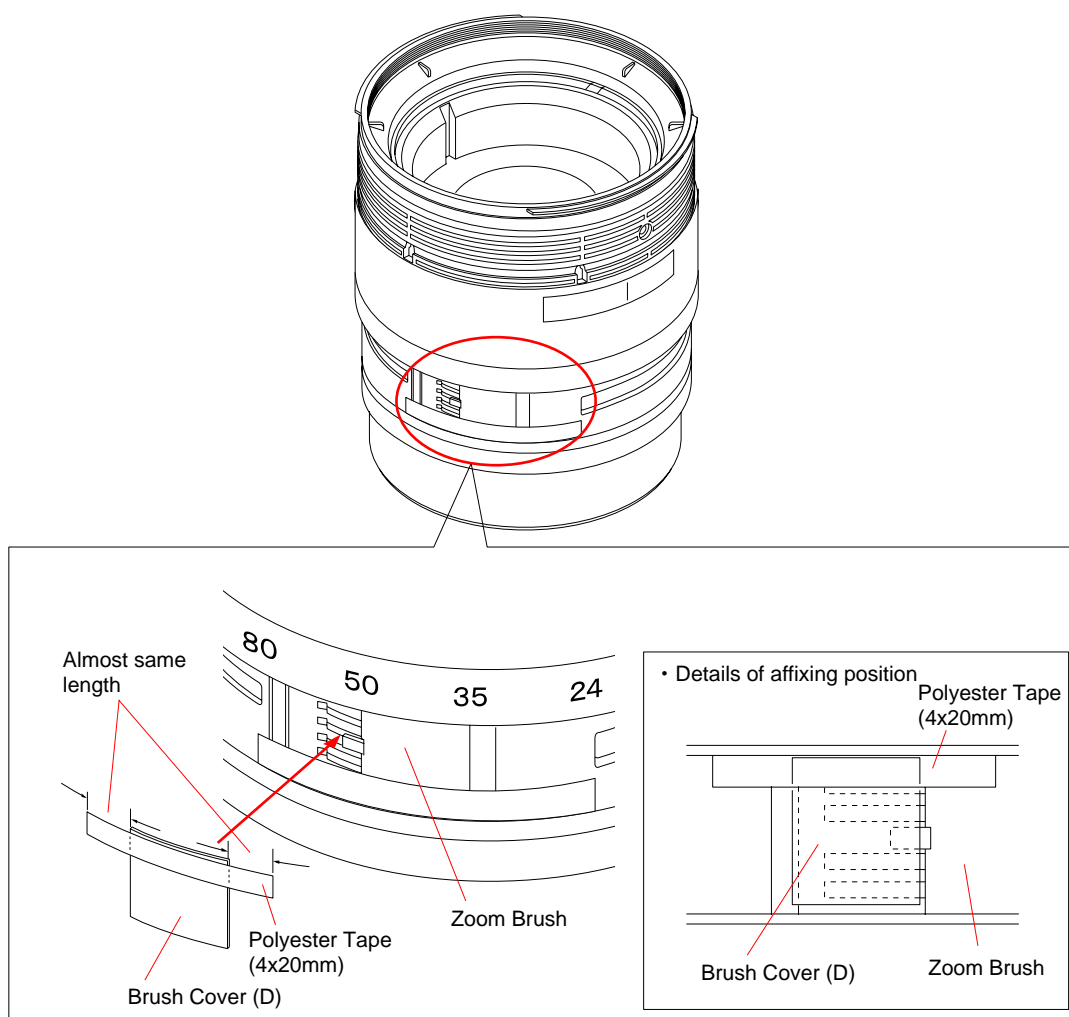
1. Inserting the projection of zoom barrel in the square hole at the center of brush, install the zoom brush and move it in the arrow direction.



2. Affix the polyester tape cut as instructed to the location shown in the figure.



3. Affix the polyester tape cut as instructed to the brush cover (D) as shown in the figure.
4. Install the brush cover (D) at the position shown in the figure and fix it with the polyester tape.

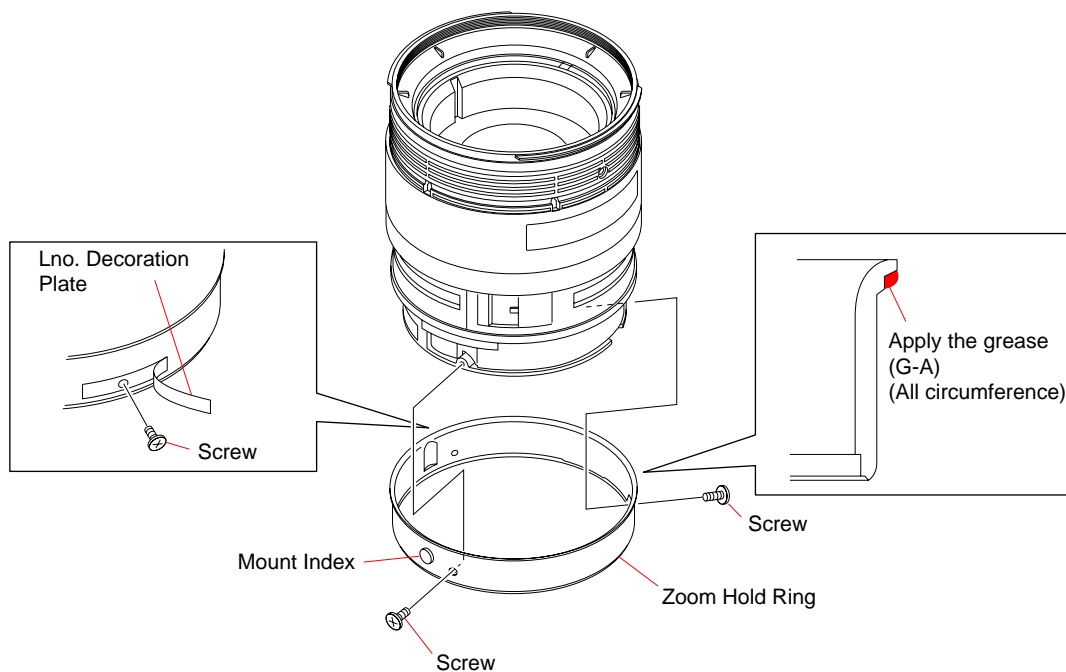


HELP06

Grease (G-115): J-6082-627-A

Grease (G-117): J-6082-660-A

1. Apply the grease (G-A) to the indicated portion of zoom hold ring.
Grease (G-A) = (G-115 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)
2. Install the zoom hold ring, placing its mount index at the position shown in the figure. Then, tighten three screws to fix zoom hold ring. When tightening one of three screws, remove the part of Lno. Decoration plate.



HELP07

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

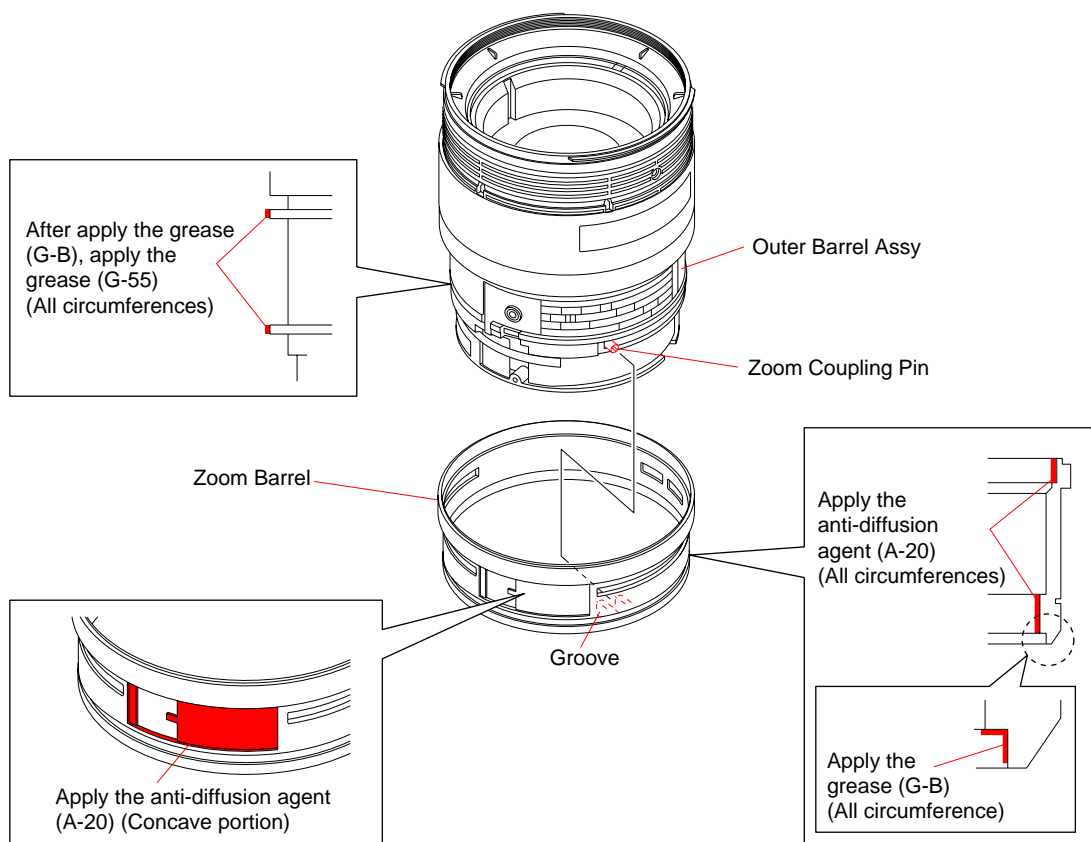
Grease (G-55): J-6082-623-A

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

Grease (G-117): J-6082-660-A

1. Apply the grease (G-55) to the indicated portion of outer barrel assembly.
Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)
Note: Be careful not to apply the grease to the main flexible unit.

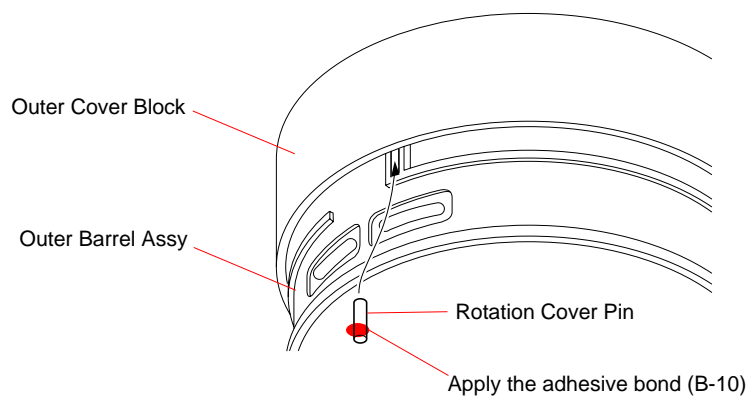
2. Apply the anti-diffusion agent (A-20) to the indicated portion of zoom barrel.
3. Apply the grease (G-B) to the indicated portion of zoom barrel.
4. Inserting the zoom coupling pin in the groove, install the zoom barrel to the outer barrel assembly.



HELP08

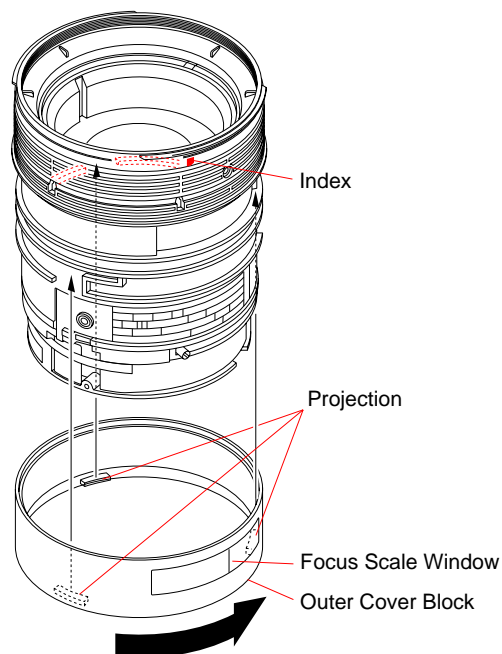
Adhesive bond (B-10): J-6082-612A

1. Install the rotation cover pin in the groove as shown in the figure.
2. Apply the adhesive bond (B-10).



HELP09

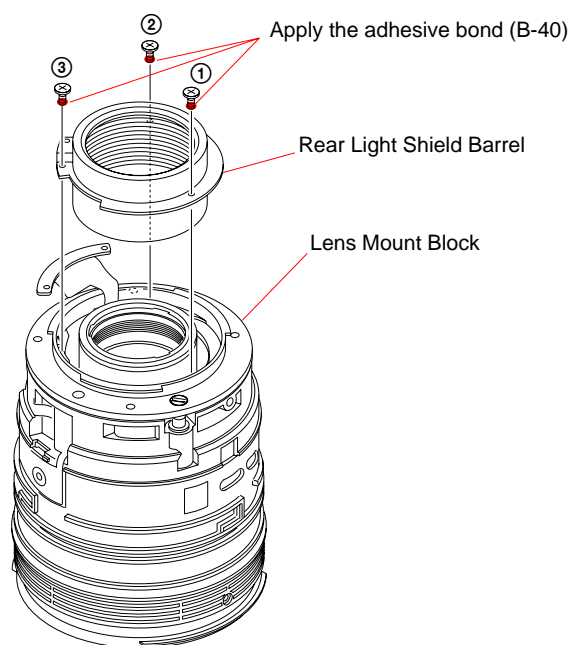
1. Clean the inner and outer sides of focus scale window of outer cover block.
2. Place the focus scale window of outer cover block to the index side, insert three projections at inner side to the rib-less portion of outer barrel assembly aligning them, and rotate it in the arrow direction until it clicks.
3. Confirm that no scar is found on the focus scale window and no grease is attached.



HELP10

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

Install the rear light shield barrel to the lens mount block, apply the adhesive bond (B-40) to the screwed portions of three screws shown in the figure, and tighten the screws in the order of ① to ③.



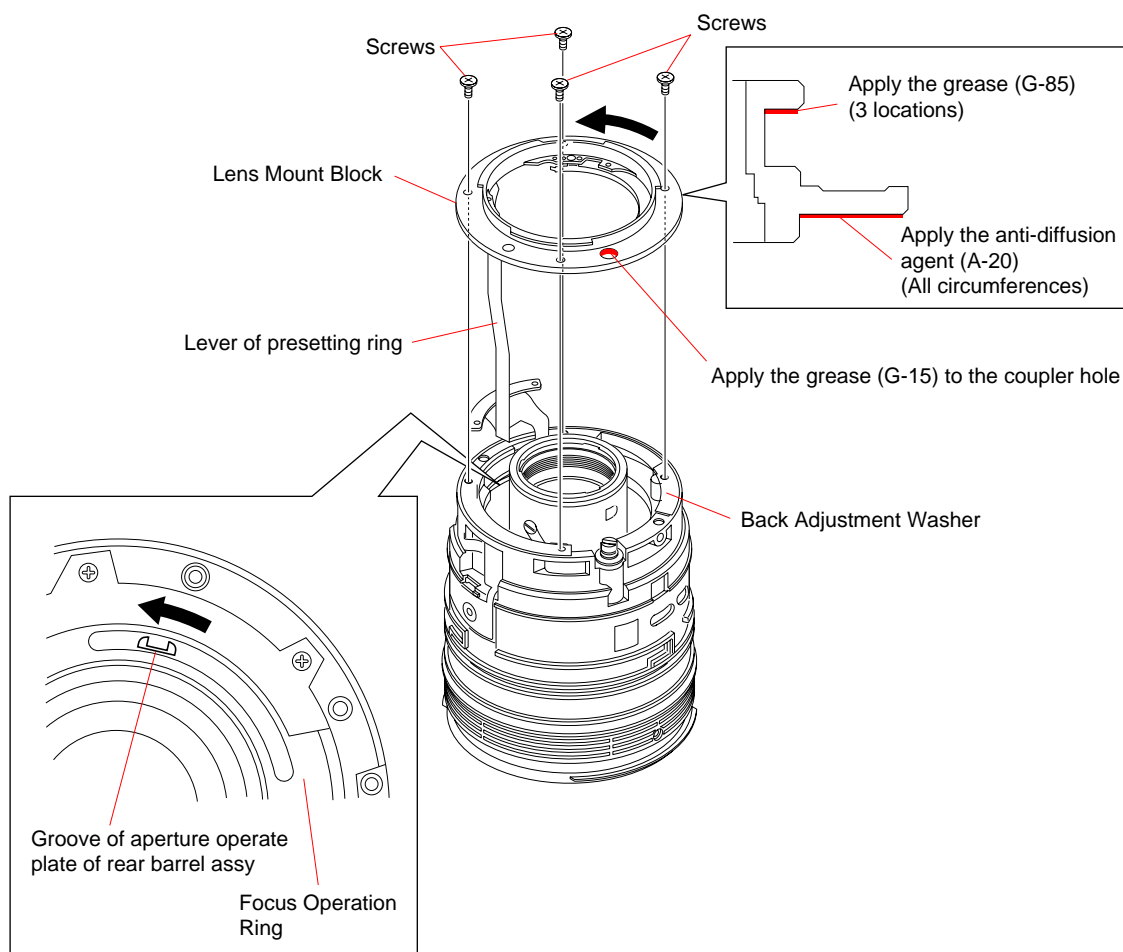
HELP11

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

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

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

1. Apply the anti-diffusion agent (A-20) and grease (G-85 and G-15) to the indicated portion of lens mount block.
2. Move the groove of aperture operate plate of rear barrel assy shown in the figure in the lens in the arrow direction to close the aperture.
3. Install the back adjustment washer.
4. Linking the lever of preset ring to the groove of aperture operate plate of rear barrel assy, install the lens mount block.
5. Turning counterclockwise the lens mount block, tighten diagonally four screws shown in the figure.



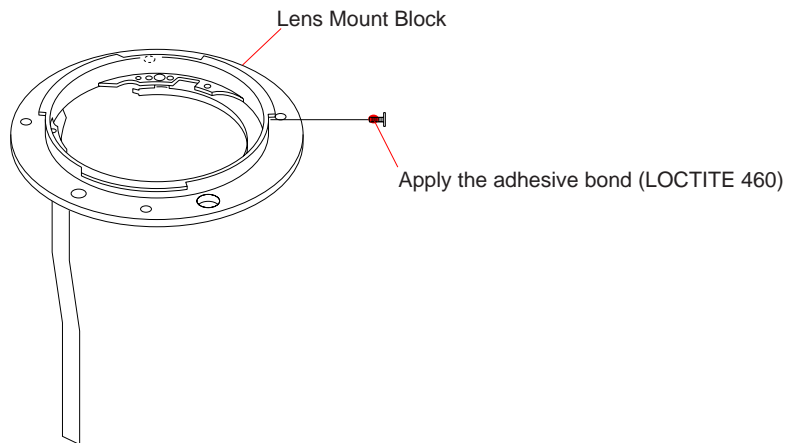
HELP12

Adhesive bond (LOCTITE 460)

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

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

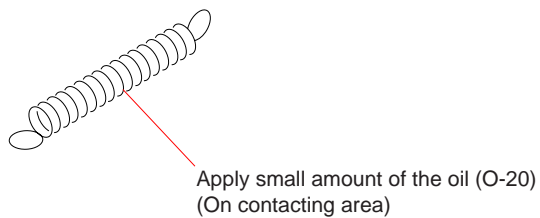
Apply the adhesive bond (LOCTITE 460) to the tip of stopper screw and tighten it to the lens mount block.



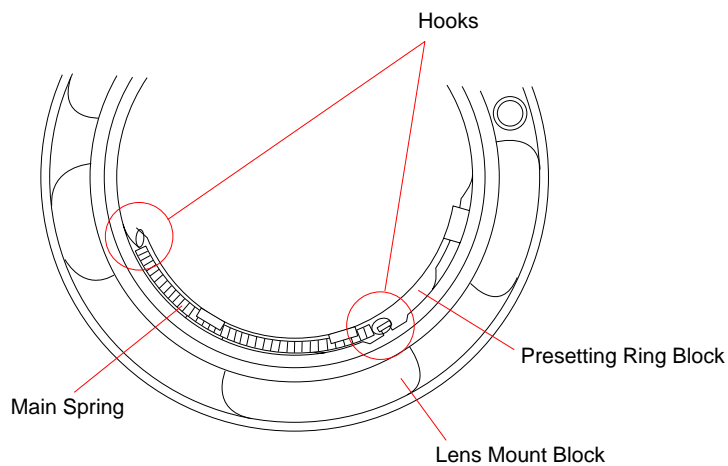
HELP13

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

1. Apply a little amount of oil (O-20) to the indicated portion of main spring.



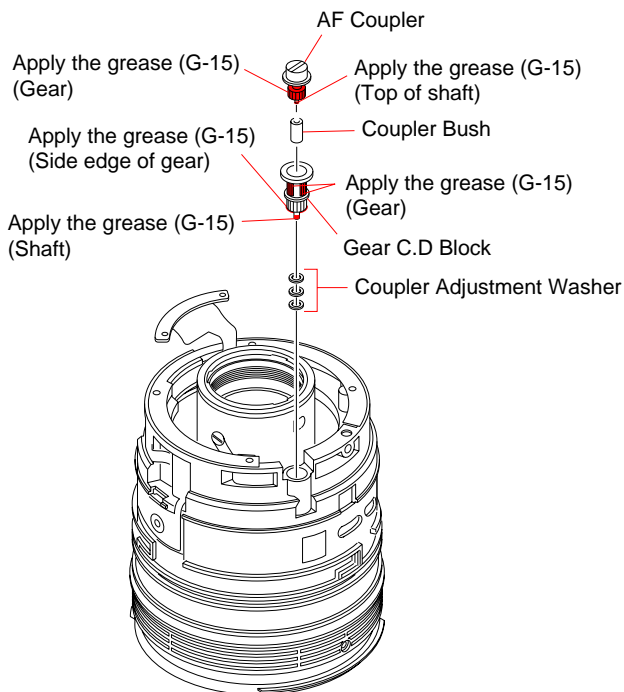
2. Hook the main spring to the lens mount block and presetting ring block as shown in the figure.



HELP14

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

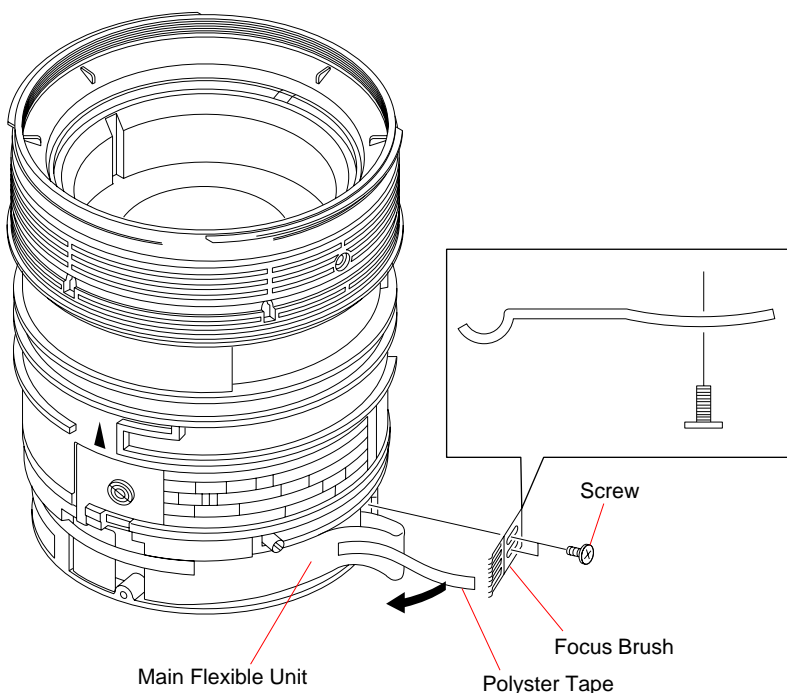
1. Install the coupler adjustment washer to the location shown in the figure.
2. Apply the grease (G-15) to the gear C.D block and the indicated portion of AF coupler.
And install them.



HELP15

1. Set the focus ring to the ∞ side.
2. Peel off the polyester tape fixing the main flexible unit shown in the figure and lift up a little the main flexible unit with tweezers.
3. Install the focus brush with two screws.

Note: Install the focus brush in the direction shown in the detailed figure.

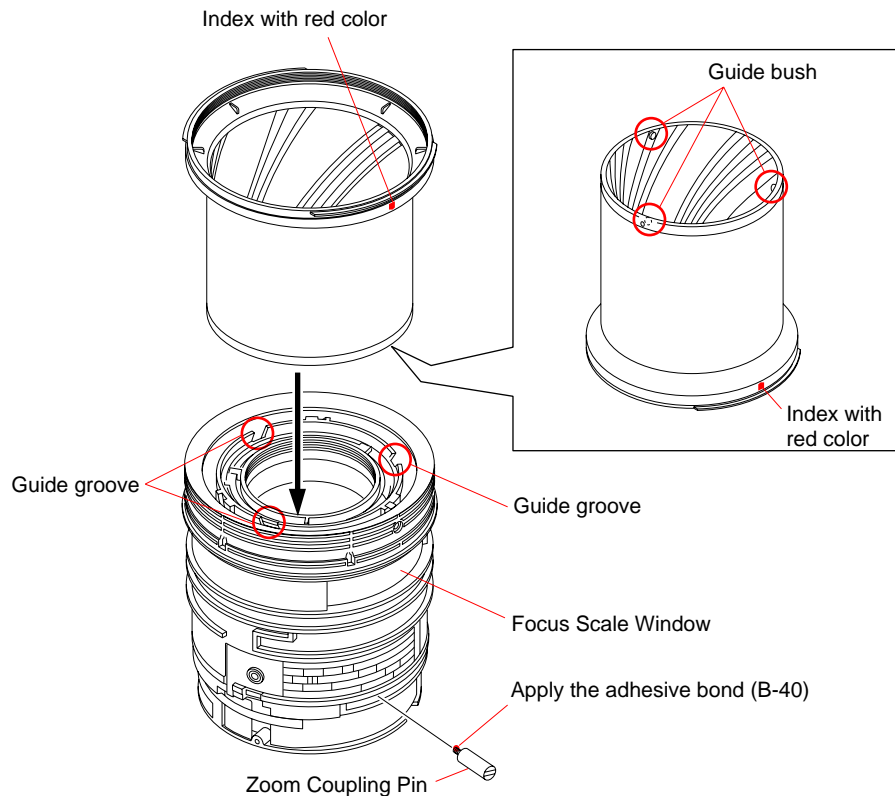


SAL1680Z (Vario-Sonnar DT 3.5-4.5/16-80 ZA) (Vario-Sonnar T* DT 16-80mm F3.5-4.5 ZA)

HELP16

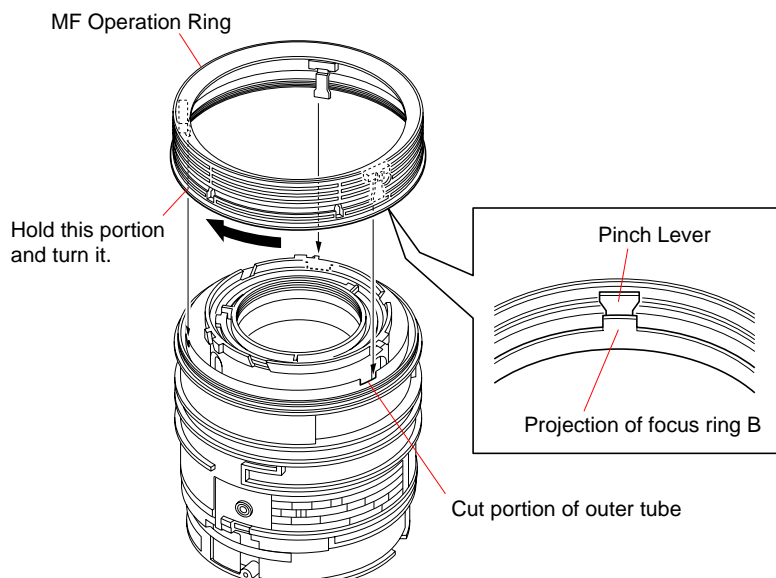
Adhesive bond (B-40): J-6082-614-A

1. Set the zoom to the tele end.
2. Set the index with red color of 1st lens holder block to the focus scale window side and push the guide bush at three locations in the guide groove straightly.
3. Apply the adhesive bond (B-40) to the screwed portion of zoom coupling pin and tighten the zoom coupling pin.



HELP17

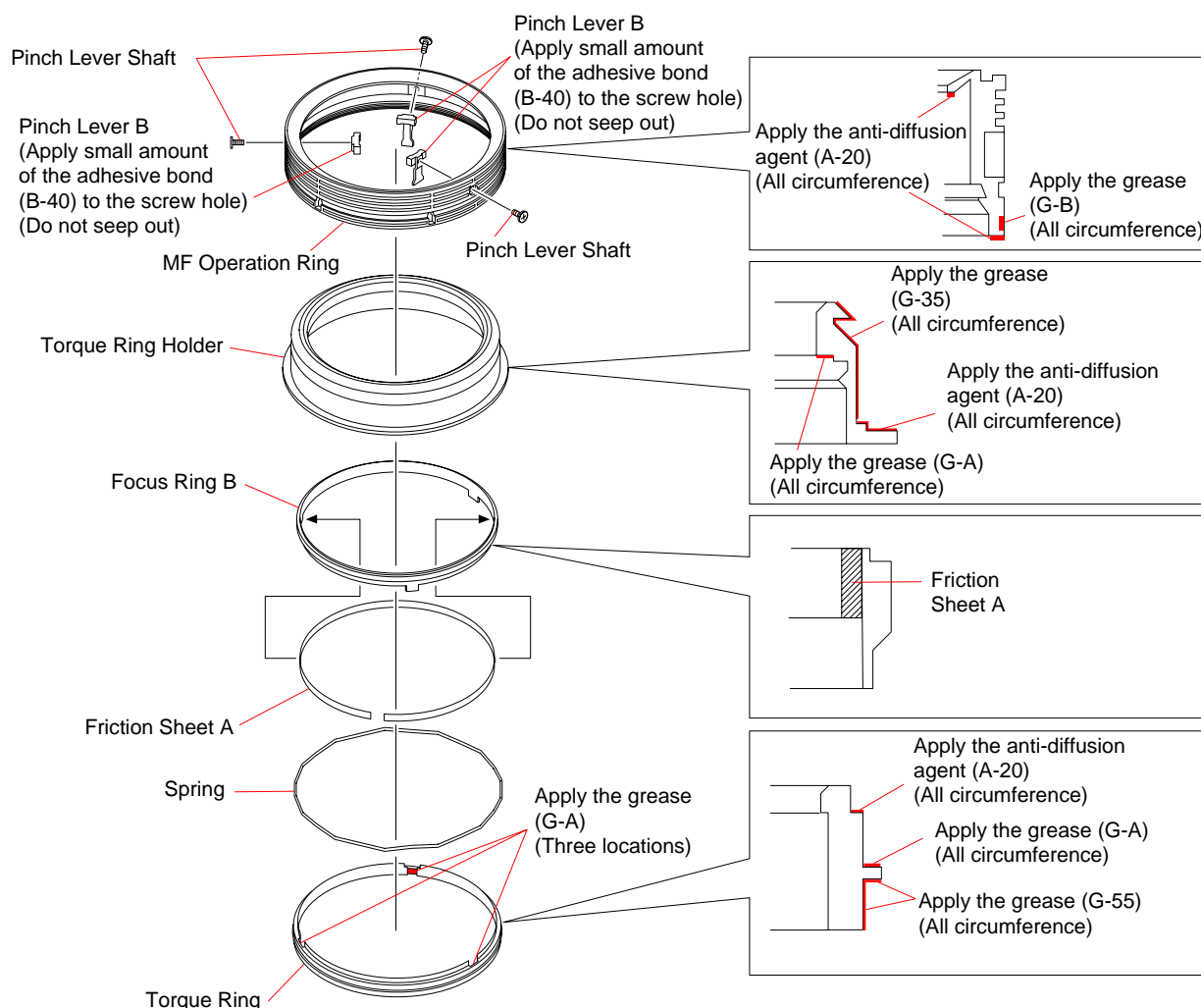
1. Align the projection of focus ring B of MF operation ring block with the pinch lever.
2. Aligning three projections of focus ring B with three cut portions of outer tube, install the focus ring B. Then, holding its lower part by hand, turn clockwise the MF operation ring block and install it.



HELP18

Anti-diffusion agent (A-20):	J-6082-611-A
Adhesive bond (B-40):	J-6082-614-A
Grease (G-35):	J-6082-621-A
Grease (G-55):	J-6082-623-A
Grease (G-115):	J-6082-627-A
Grease (G-116):	J-6082-628-A
Grease (G-117):	J-6082-660-A

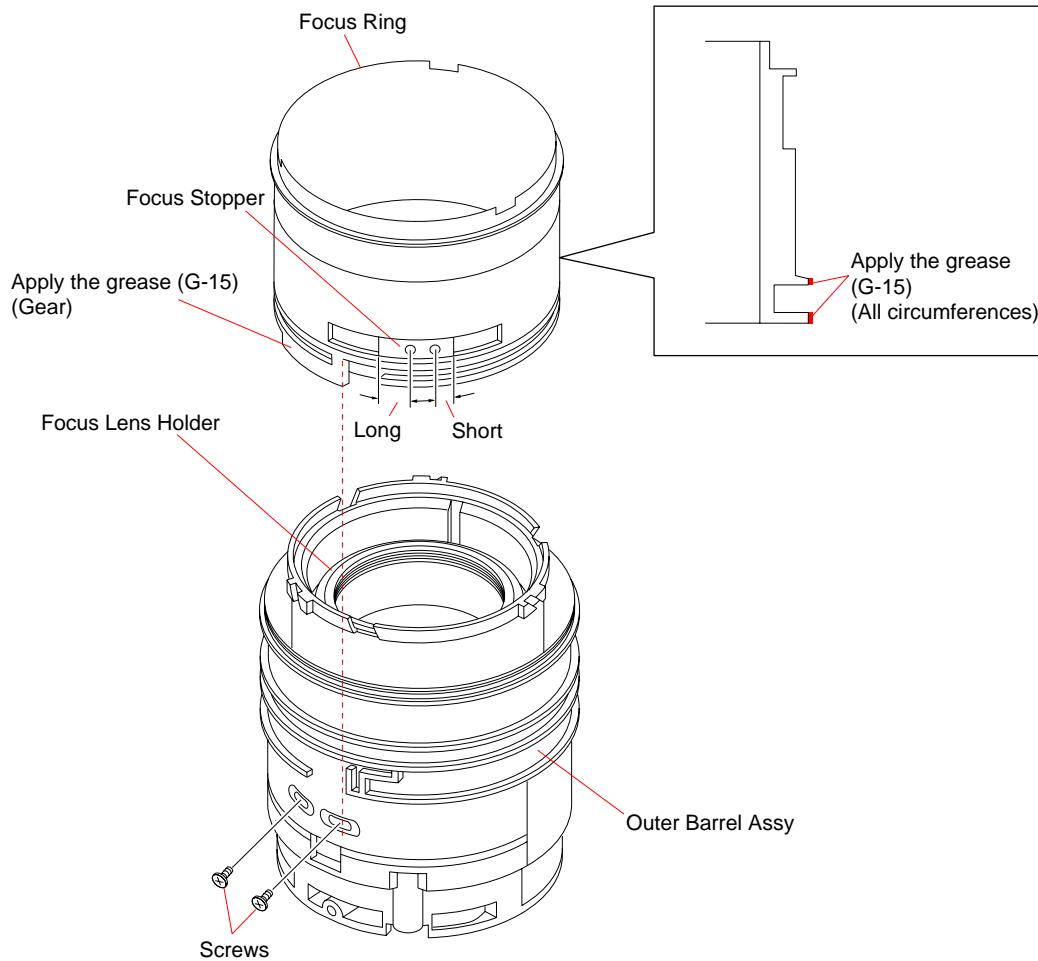
1. Apply the anti-diffusion agent (A-20) and following grease (G-B) to the indicated portion of MF operation ring.
Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)
2. Apply the anti-diffusion agent (A-20), grease (G-35) and following grease (G-A) to the indicated portion of torque ring holder.
Grease (G-A) = (G-115 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)
3. Assemble the torque ring holder into the MF operation ring in the direction shown in the figure until it clicks.
4. Apply small amount of the adhesive bond (B-40) to the screw hole of pinch lever (Wipe seeping out bond off) and install the pinch lever to the MF operationring by the pinch lever shaft. (two locations)
5. Apply small amount of the adhesive bond (B-40) to the screw hole of pinch lever B (Wipe seeping out bond off) and install the pinch lever B to the MF operation ring by the pinch lever shaft. (One location)
6. Affix the friction sheet A to the inner side of focus ring B.
7. Apply the anti-diffusion agent (A-20), grease (G-55) and following grease (G-A) to the indicated portion of torque ring.
Grease (G-A) = (G-115 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)
Note: Wipe out the extra grease (G-55) on the area other than the indicated portion.
8. Assemble the MF operation ring, focus ring B and torque ring (setting the spring) in the orders shown in the figure.



HELP19

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

1. Apply the grease (G-15) to the gear of focus ring and the indicated portion.
2. Rotate clockwise the focus lens holder as far as it goes and set the zoom to the wide end.
3. Place the long side of focus stopper to the gear side as shown in the figure and install it in the groove of focus ring.
4. Aligning the end of gear of focus ring with the hole of outer barrel as shown in figure, assemble the focus ring into the outer barrel assembly.
5. Turn a little clockwise the focus ring so that the screw holes of focus stopper can be seen in the two holes of outer barrel assembly.
6. Tighten two screws.



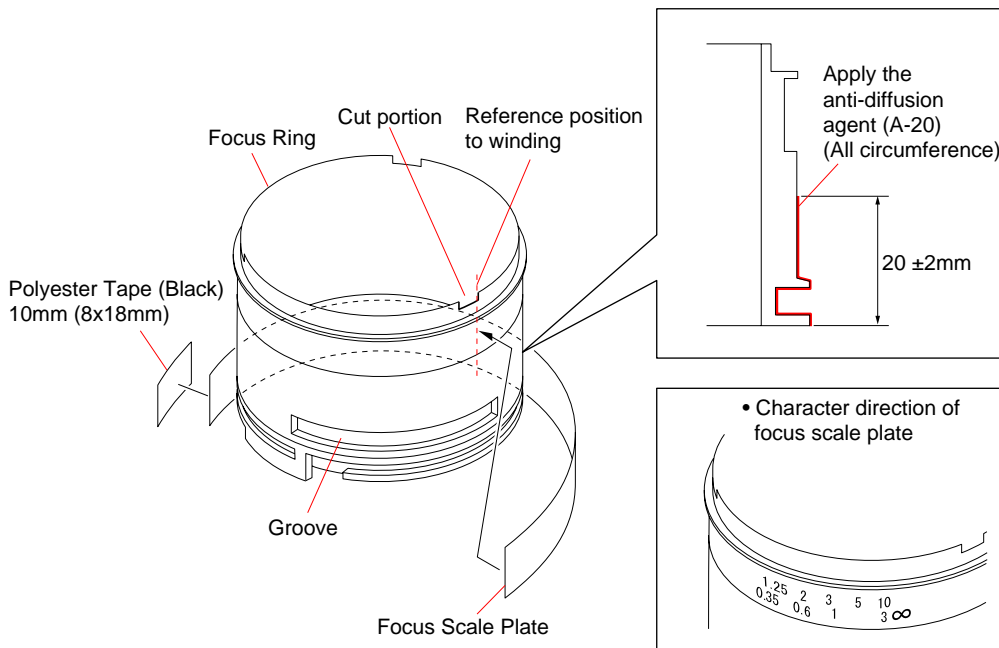
HELP20

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

1. Apply the anti-diffusion agent (A-20) to the indicated portion of focus ring.
2. Aligning with the right end of cut portion on the top of groove of focus ring, install the focus scale plate.
Affix the polyester tape (black) 10mm cut as instructed to the location shown in figure.

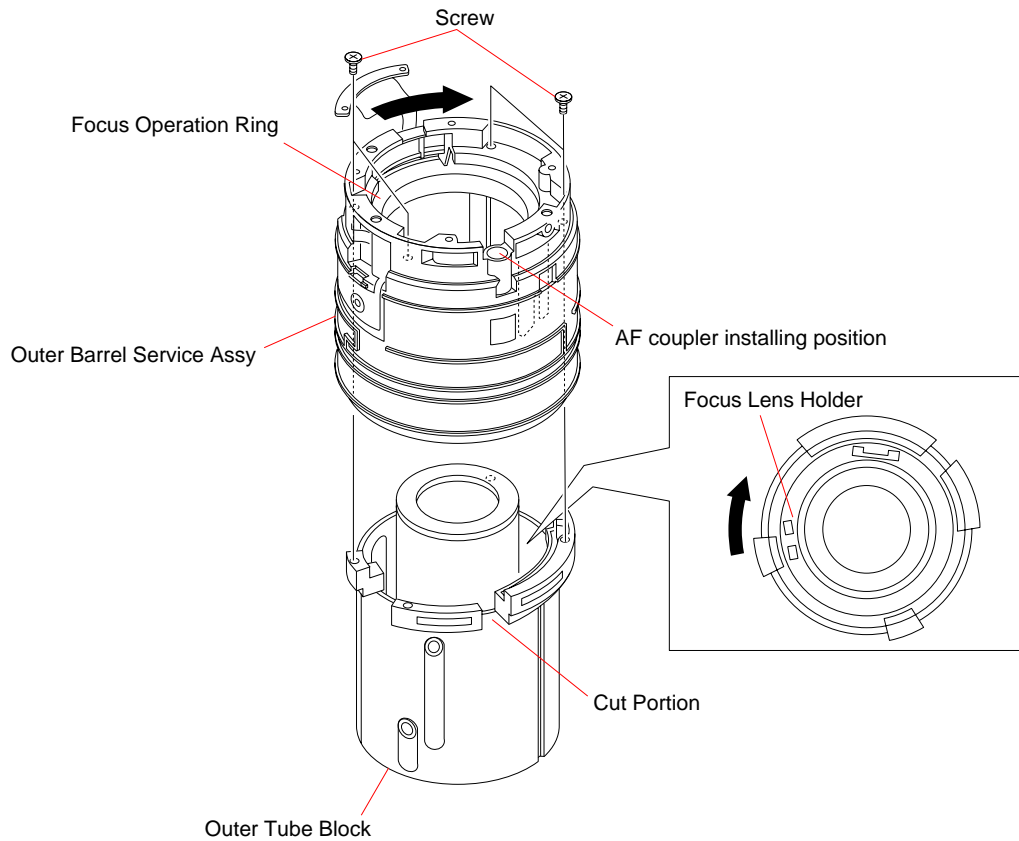
Note:

- Install the focus scale plate in the direction marked with characters in the figure.
- Fix the focus scale plate with the polyester tape (black) 10mm not to loose.



HELP21

1. Rotate fully clockwise (in the arrow direction) the focus operation ring in the outer barrel service assembly.
2. Rotate fully clockwise (in the arrow direction) the focus lens holder in the outer tube block.
3. Inserting the installation part of coupler in the cut portion of outer tube block, assemble the outer barrel assembly.
At this moment, insert the lever of focus operation ring in the lever groove of focus lens holder.
4. While pushing and rotating clockwise the outer barrel assembly, tighten diagonally four screws shown in the figure.



HELP22

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

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

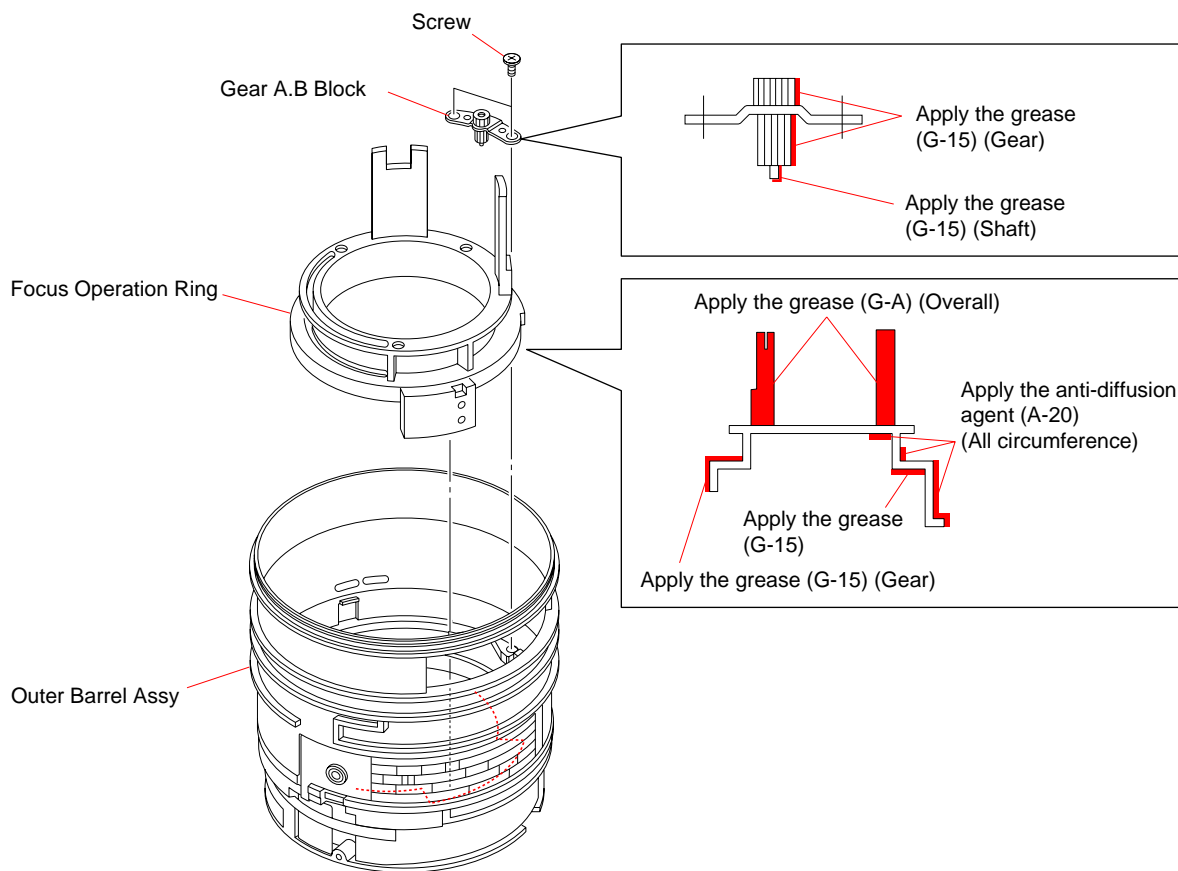
Grease (G-115): J-6082-627-A

Grease (G-117): J-6082-660-A

1. Apply the anti-diffusion agent (A-20), grease (G-15) and following grease (G-A) to the indicated locations of focus operation ring block.

Grease (G-A) = (G-115 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)

2. Apply the grease (G-15) to the indicated portions of A.B block.
3. Inserting the lever of focus operation ring in the cut portion of inner side of outer barrel assembly, install the focus operation ring.
4. Engage the gear A.B block with gear of focus operation ring and tighten two screws to fix the gear A.B block.

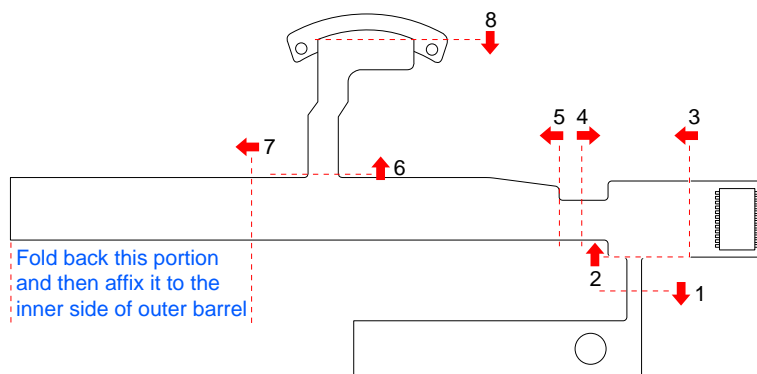


HELP23

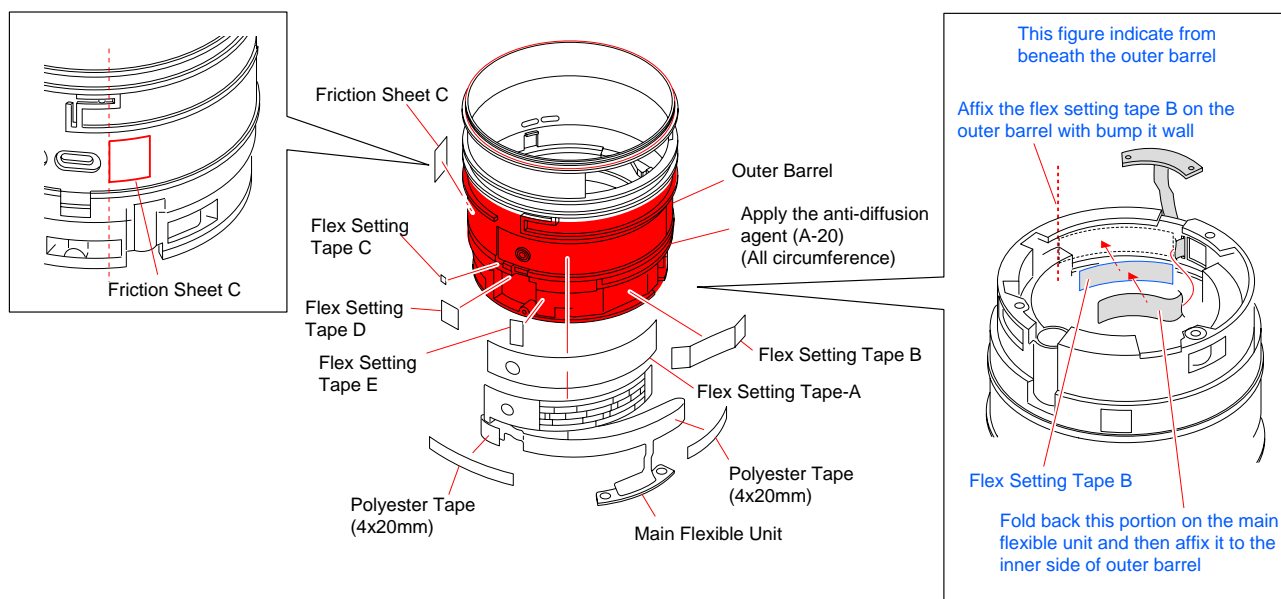
Anti-diffusion agent: J-6082-611-A

Cleaning liquid: J-6082-622-A

1. Clean the indicated portion of outer barrel with gauze dipped in the cleaning liquid.
2. Fold the main flexible unit at the locations shown in the figure. (8 locations)



3. Apply the anti-diffusion agent (A-20) to the indicated portion of outer barrel.
4. Affix the main flexible unit and the friction sheet C to the indicated portion of outer barrel.
5. Affix the polyester tape cut as instructed to the location shown in figure.



HELP24

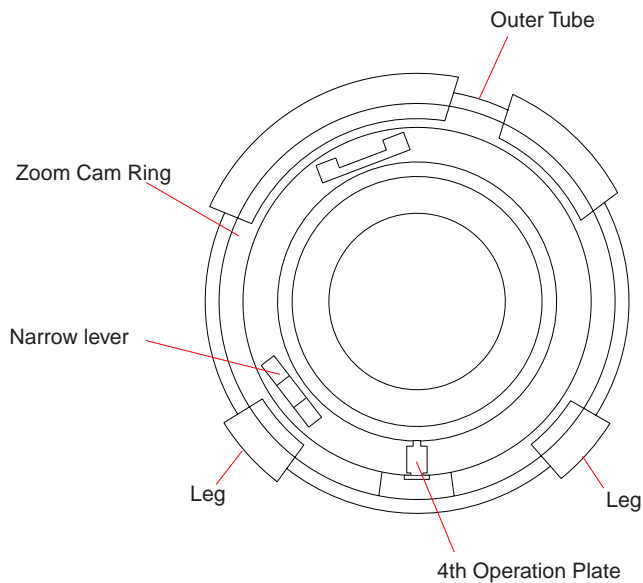
Adhesive bond (B-40): J-6082-614-A

Note: Before assembling, confirm that the rear barrel assembly moves smoothly.

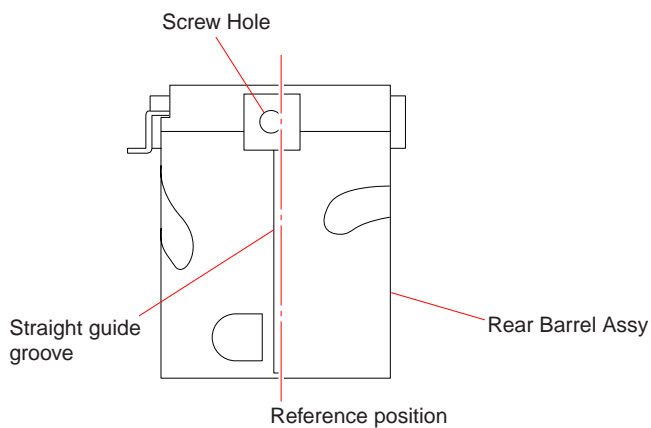
After replacing the rear barrel assembly, adjust the aperture diameter.

1. Adjust by rotating the zoom cam ring so that the 4th operation plate comes in the middle (groove position at the side of outer tube) of two small legs of outer tube.

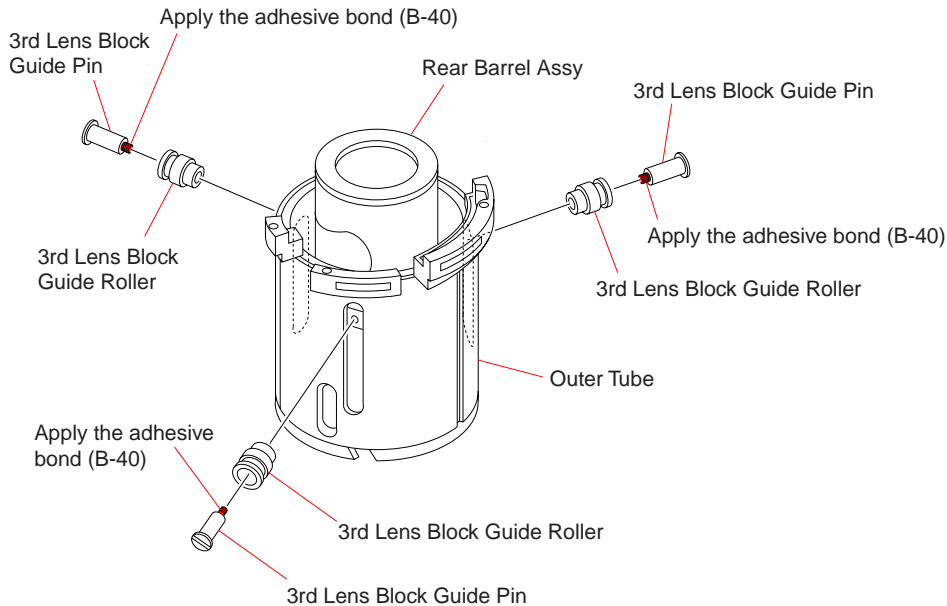
At this moment, confirm that the narrow width lever of focus coupling barrel assy positions at the location shown in the figure.



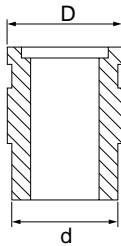
2. Aligning the screw hole with the linear guide groove at the side, adjust the rear barrel assembly to reference position.



3. Inserting the tip of 4th operation plate in the linear guide groove, assemble the rear barrel assembly into the outer tube.
4. Select the 3rd lens block guide roller fitting to the grooves of zoom cam ring and outer tube and install it in the guide grooves. Then, tighten the 3rd lens block guide pin of which the screwed portion is applied with the adhesive bond (B-40). (Install at three locations.)

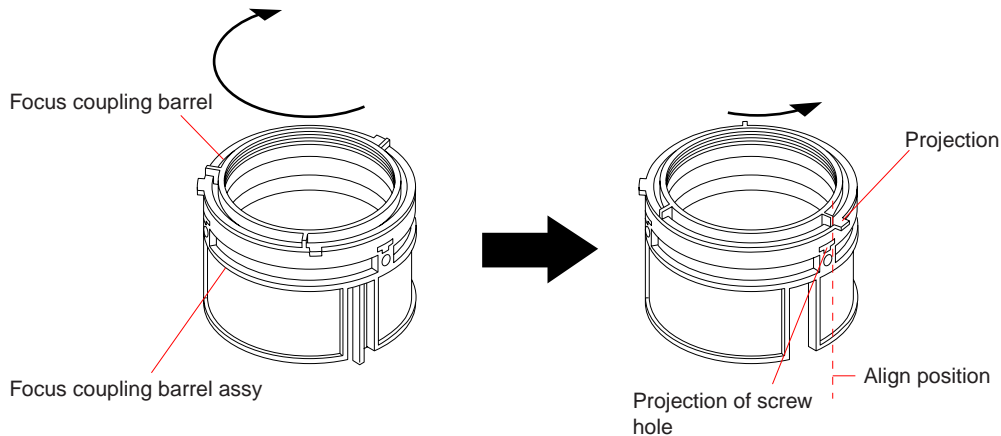


Par Number	Part Name	Dimension (mm)	
		Diameter of D	Diameter of d
3-197-211-01	3rd Lens Block Guide Roller	4.81	4.61
3-197-212-01	3rd Lens Block Guide Roller	4.81	4.62
3-197-213-01	3rd Lens Block Guide Roller	4.81	4.63
3-197-216-01	3rd Lens Block Guide Roller	4.82	4.61
3-197-217-01	3rd Lens Block Guide Roller	4.82	4.62
3-197-218-01	3rd Lens Block Guide Roller	4.82	4.63
3-197-219-01	3rd Lens Block Guide Roller	4.83	4.61
3-197-220-01	3rd Lens Block Guide Roller	4.83	4.62
3-197-221-01	3rd Lens Block Guide Roller	4.83	4.63

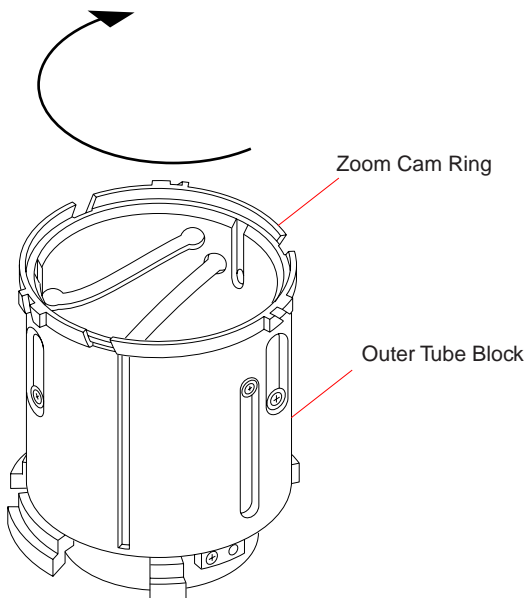


HELP25

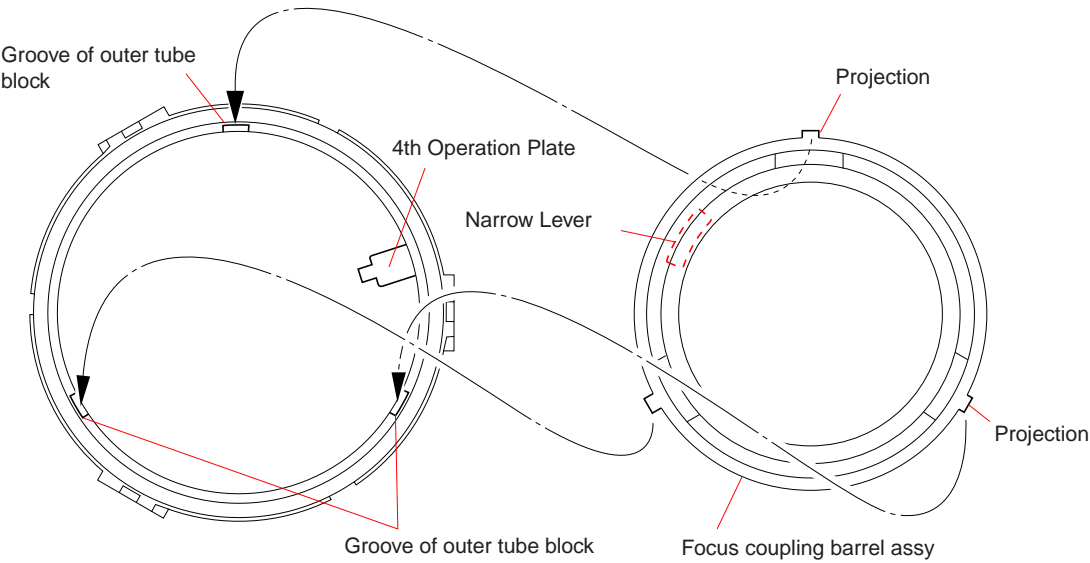
1. Install the focus coupling barrel to the focus lens holder while inserting three outer projections of focus operation ring in the cut portions of focus lens holder.
2. Install the 2nd lens holder to the focus operation ring while inserting three projections at the inner side of coupling barrel into three grooves of 2nd lens holder.
3. Rotate fully the coupling barrel of focus coupling barrel assy assembled in step 3 in the arrow direction and turn it back a little so that the left end of projection aligns with the right end of projection at the screw hole of focus lens holder as shown in the figure.



4. Rotate fully the zoom cam ring of outer tube in the arrow direction.

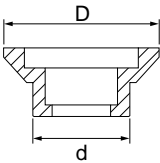


5. Set the relationship between the narrow width lever of focus coupling barrel assy and the 4th operation plate of outer tube as shown in the figure. Then, insert the three projections of focus coupling barrel assy in three grooves of outer tube and align the screw hole of focus coupling barrel assy with the guide groove at the side face.

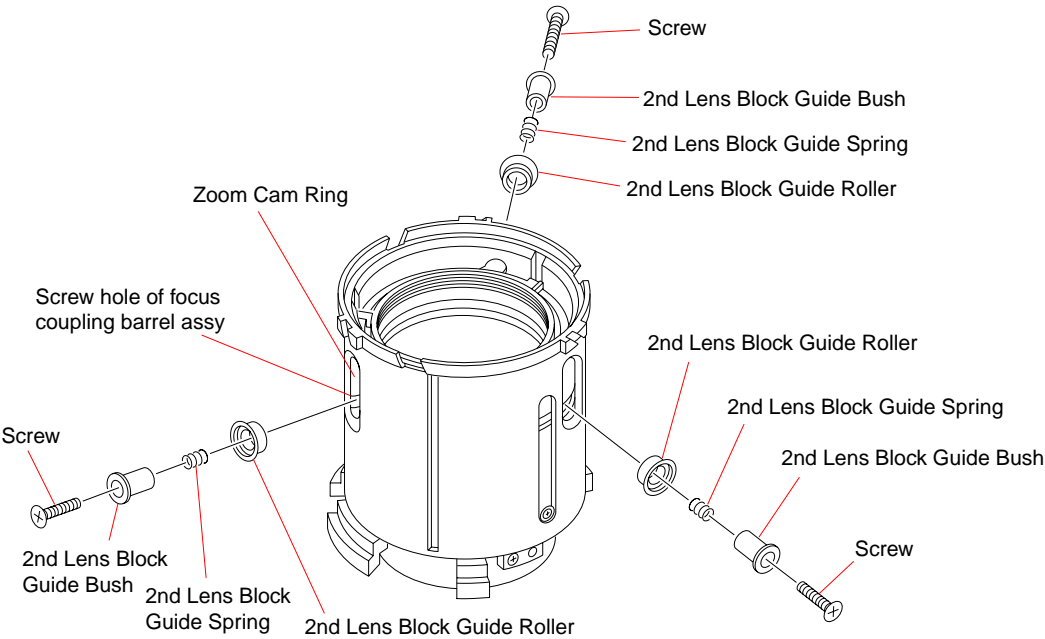


6. Select the 2nd lens block guide roller fitting to the guide groove of zoom cam ring and install the 2nd lens block guide roller in the guide groove. (3 locations)

Par Number	Part Name	Dimension (mm)
		Diameter of D
3-197-202-01	2nd Lens Block Guide Roller	4.31
3-197-203-01	2nd Lens Block Guide Roller	4.32
3-197-204-01	2nd Lens Block Guide Roller	4.33



7. Install the 2nd lens block guide spring and 2nd lens block guide bush and tighten them with three screws. (3 locations)

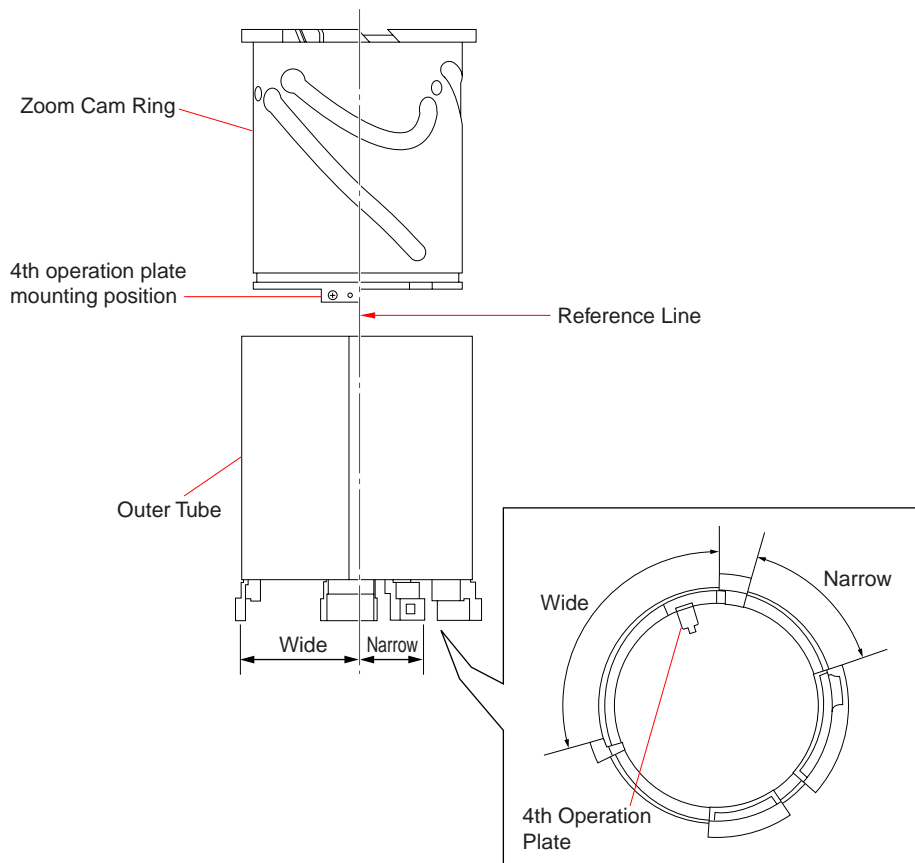


HELP26

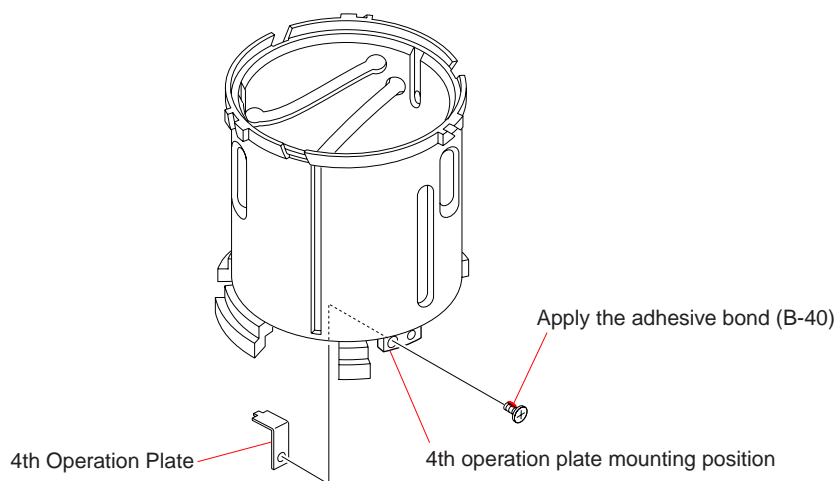
Adhesive bond (B-40): J-6082-614-A

1. Aligning the right end of 4th operation plate installation part with the reference line shown in the figure, assemble the zoom cam ring into the outer tube.

After assembling, confirm that the installation part of 4th operation plate locates at the side where the distance between legs is wider as shown in the figure.



2. Tighten the 4th operation plate with the screw of which screwed portion is applied with the adhesive bond (B-40).



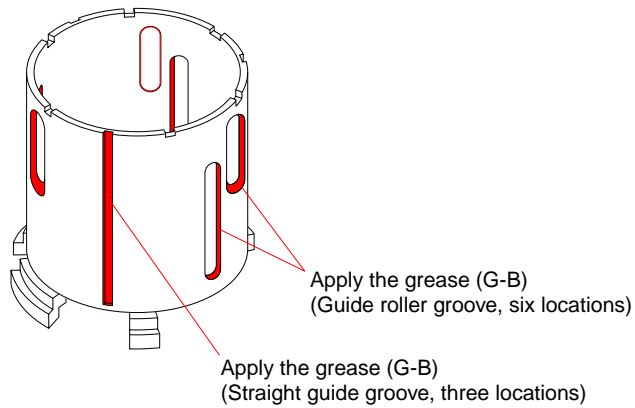
HELP27

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

Grease (G-117): J-6082-660-A

Apply the following grease (G-B) to the indicated portion of outer tube.

Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)



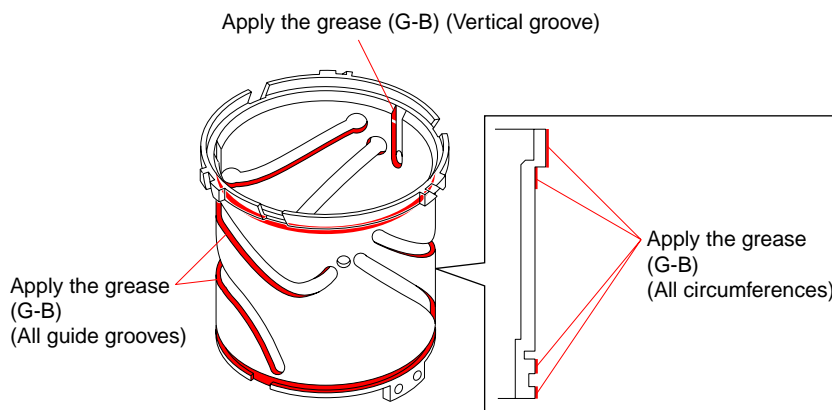
HELP28

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

Grease (G-117): J-6082-660-A

Apply the following grease (G-B) to the indicated portion of zoom cam ring.

Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)



3. REPAIR PARTS LIST

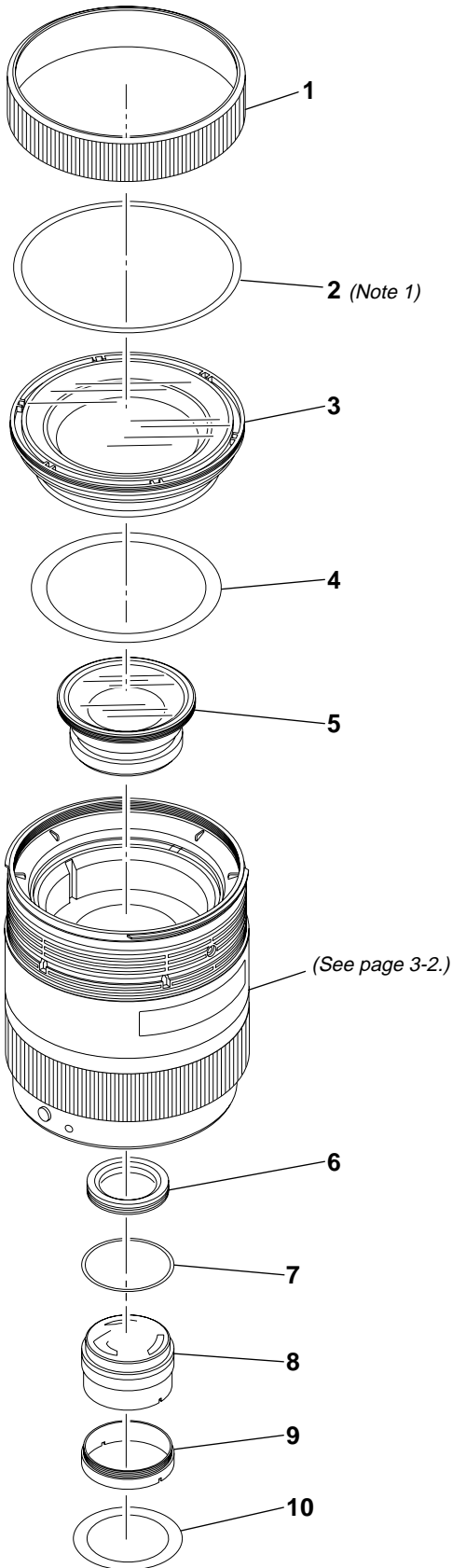
DISASSEMBLY

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 BLOCK

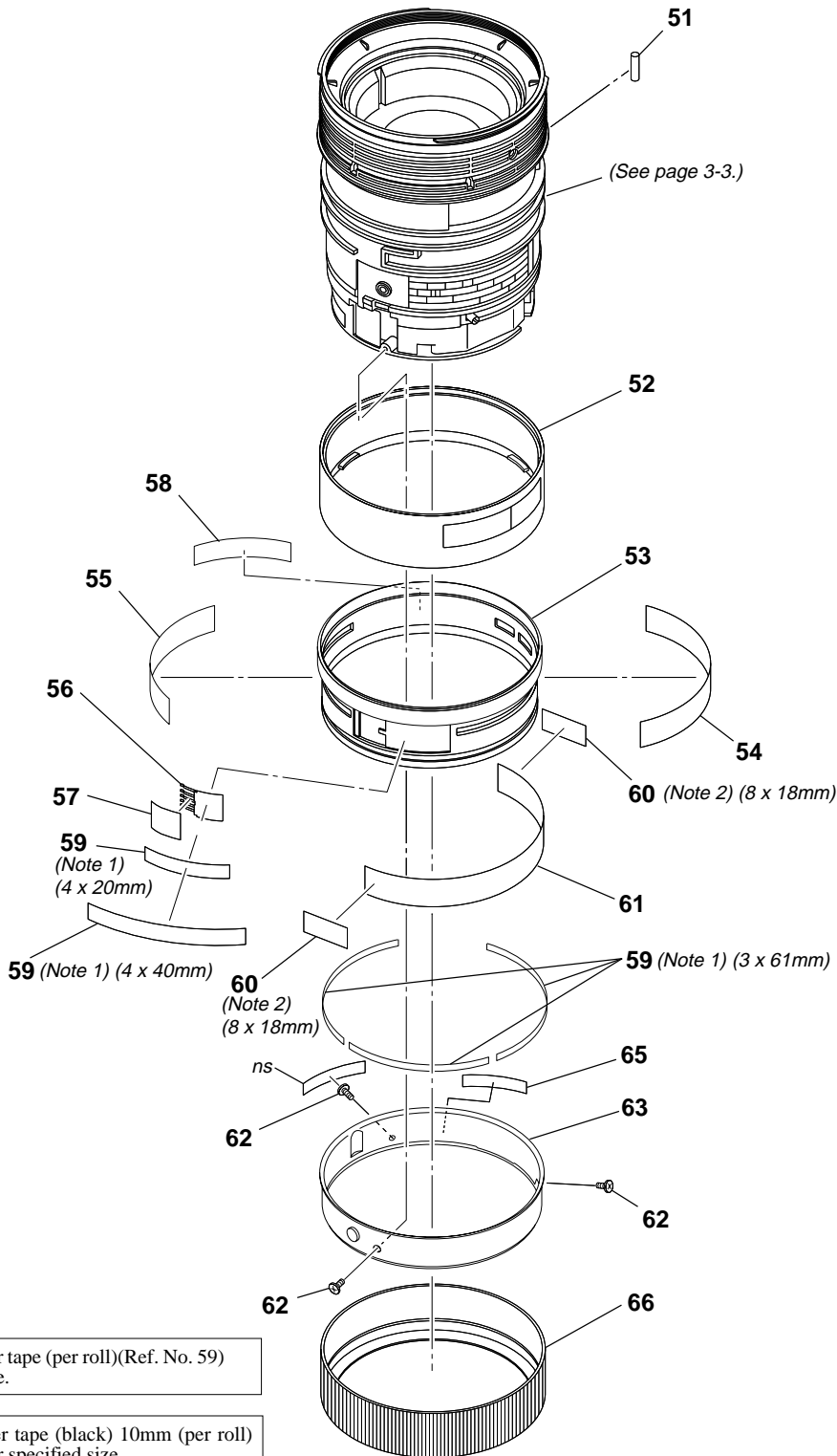


Ref. No.	Part No.	Description
1	3-197-281-01	FOCUS RUBBER RING
2	2-890-787-01	FRONT DECORATION PLATE (Note 1)
3	A-1253-982-A	1ST LENS BLOCK
4	3-197-143-01	LIGHT SHIELD PLATE A
5	A-1253-983-A	2ND LENS BLOCK
6	A-1253-984-A	3RD LENS BLOCK
7	3-197-147-01	3-4 ADJUSTMENT WASHER
8	A-1253-985-A	4TH LENS BLOCK
9	3-197-130-01	APERTURE HOLD RING
10	3-197-144-01	LIGHT SHIELD PLATE B

(Note 1) Be sure avoiding replacement of front decoration plate (Ref. No. 2) as far as possible. If replacement of it should be need, you convey the message to your user that changing of the “Carl Zeiss Serial No.” is needed, and then you may obtain user's agreement, and it replace.

3-1-2. ZOOM BRUSH, ZOOM BARREL AND OUTER COVER BLOCK

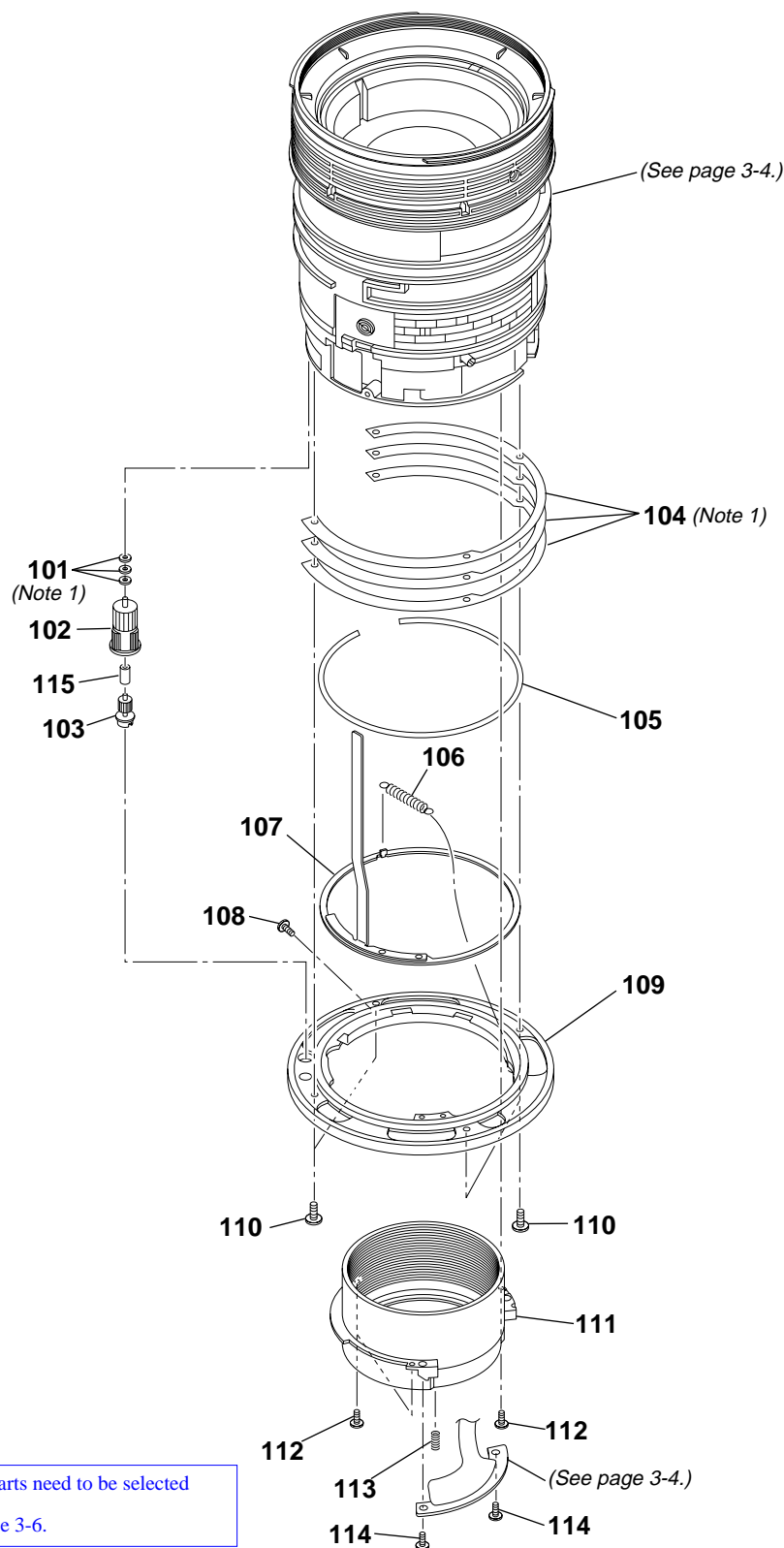
ns: not supplied



Ref. No.	Part No.	Description
51	3-197-284-01	ROTATION COVER PIN
52	A-1253-998-A	OUTER COVER BLOCK
53	3-197-271-01	ZOOM BARREL
54	3-212-358-01	BRUSH COVER B
55	3-212-359-01	BRUSH COVER C
56	3-197-154-01	ZOOM BRUSH
57	3-212-356-01	BRUSH COVER D
58	3-197-076-01	FLEX SETTING TAPE B

Ref. No.	Part No.	Description
* 59	9-913-210-00	POLYESTER TAPE (Note 1)
60	9-913-210-03	POLYESTER TAPE (BLACK) 10mm (Note 2)
61	3-197-145-01	BRUSH COVER
62	3-197-258-01	SCREW 1.7X4.0
63	A-1253-997-A	ZOOM HOLD RING
65	3-197-279-01	MODEL NUMBER NAME
66	3-197-282-01	ZOOM RUBBER RING

3-1-3. LENS MOUNT BLOCK

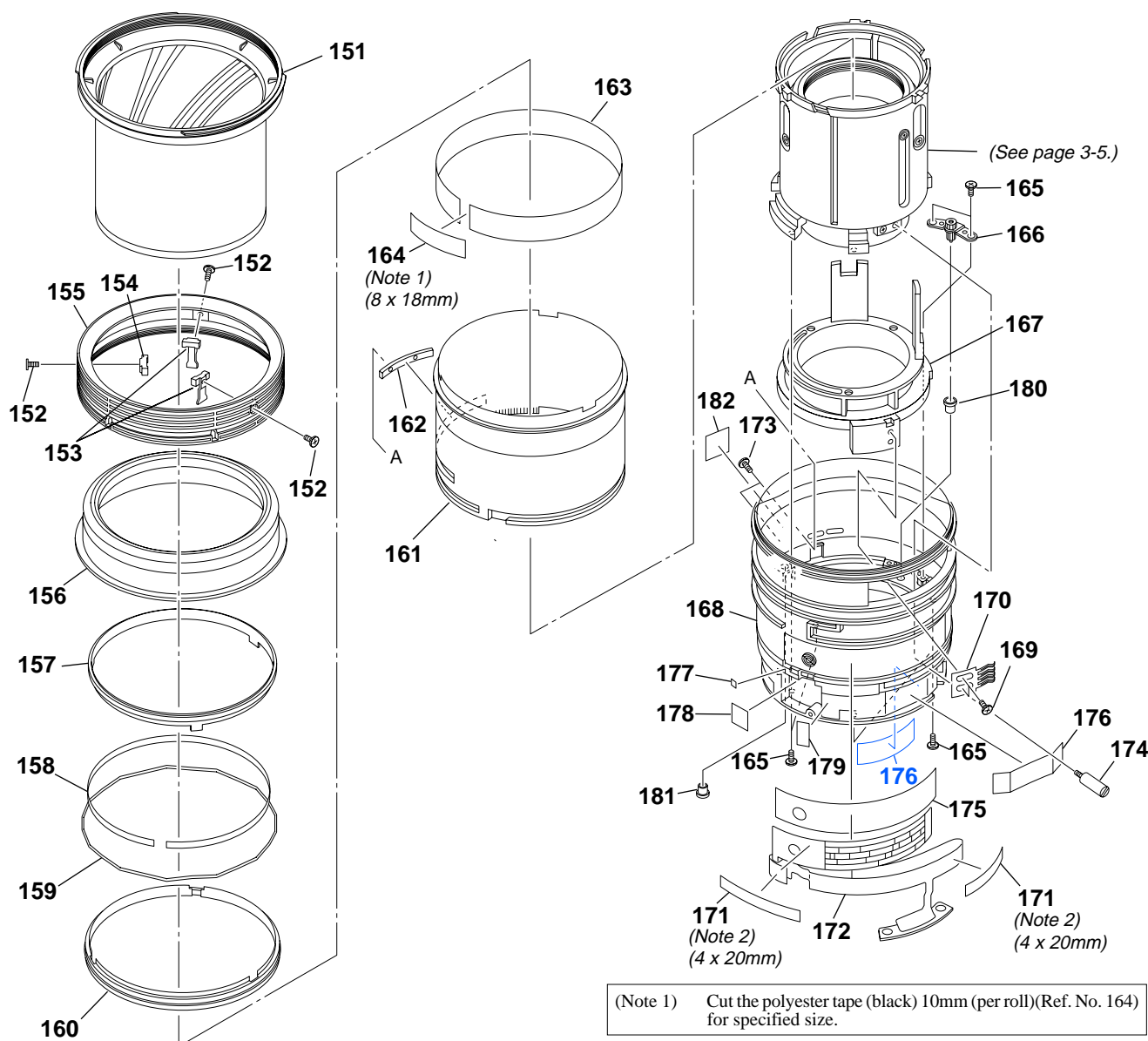


(Note 1) The number or type of these parts need to be selected according to adjustment etc..
Select the part referring to page 3-6.

Ref. No.	Part No.	Description
101	Selection parts	COUPLER ADJUSTMENT WASHER (Note 1)
102	A-1254-105-A	GEAR C.D BLOCK
103	3-197-176-01	AF COUPLER
104	Selection parts	BACK ADJUSTMENT WASHER (Note 1)
105	3-197-150-01	PRESETTING HOLDER
106	3-197-186-01	MAIN SPRING
107	A-1254-103-A	PRESETTING RING BLOCK
108	3-197-198-01	STOPPER SCREW

Ref. No.	Part No.	Description
109	A-1253-996-A	LENS MOUNT BLOCK
110	3-197-267-01	SCREW M2.0X5.0
111	3-197-140-01	REAR LIGHT SHIELD BARREL
112	3-197-188-01	SCREW M1.4X2.2
113	3-197-189-01	GROUND SPRING
114	3-197-257-01	TAPPING SCREW M1.7X4.0
115	3-214-828-01	COUPLER BUSH

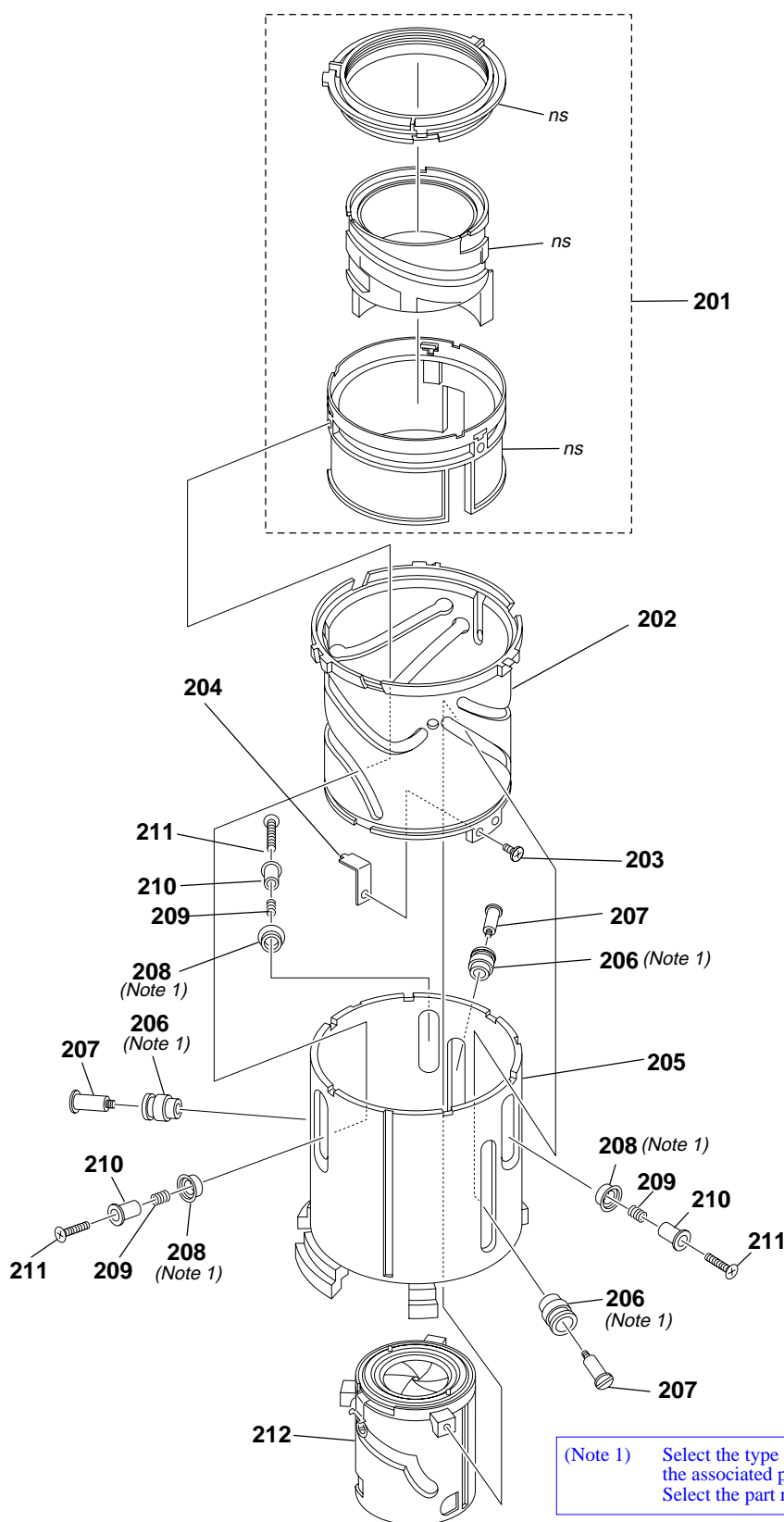
3-1-4. MAIN FLEXIBLE UNIT, FOCUS RING AND MF OPERATION RING



Ref. No.	Part No.	Description
151	A-1253-993-A	1ST LENS HOLDER BLOCK
152	3-197-192-01	PINCH LEVER SHAFT
153	2-688-255-01	PINCH LEVER
154	2-688-257-01	LEVER (PINCH LEVER B)
155	3-197-273-01	MF OPERATION RING
156	3-197-274-01	TORQUE RING HOLDER
157	3-197-142-01	FOCUS RING B
158	3-197-199-01	FRICTION SHEET A
159	3-197-175-01	SPRING
160	3-197-141-01	TORQUE RING
161	3-197-270-01	FOCUS RING
162	3-197-193-01	FOCUS STOPPER
163	3-197-278-01	FOCUS SCALE PLATE
164	9-913-210-03	POLYESTER TAPE (BLACK) 10mm (Note 1)
165	3-197-259-01	SCREW M1.7X5.0
166	A-1254-104-A	GEAR A.B BLOCK

Ref. No.	Part No.	Description
167	3-197-139-01	FOCUS OPERATION RING
168	3-197-072-01	OUTER BARREL
169	3-197-190-01	SCREW M1.4X2.5
170	3-197-153-01	FOCUS BRUSH
* 171	9-913-210-00	POLYESTER TAPE (Note 2)
172	A-1254-106-A	MAIN FLEXIBLE UNIT
173	3-197-256-01	SCREW M1.6X2.5
174	3-197-194-01	ZOOM COUPLING PIN
175	3-197-075-01	FLEX SETTING TAPE A
176	3-197-076-01	FLEX SETTING TAPE B
177	3-197-077-01	FLEX SETTING TAPE C
178	3-197-078-01	FLEX SETTING TAPE D
179	3-197-079-01	FLEX SETTING TAPE E
180	3-197-073-01	GEAR BUSH B
181	3-197-074-01	GEAR BUSH
182	3-197-248-01	FRICTION SHEET C

3-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY



Ref. No.	Part No.	Description
201	A-1253-992-A	FOCUS COUPLING BARREL ASSY
202	3-197-134-01	ZOOM CAM RING
203	3-197-255-01	SCREW M1.6X2.5
204	3-197-146-01	4TH OPERATION PLATE
205	3-197-135-01	OUTER TUBE
206	Selection parts	3RD LENS BLOCK GUIDE ROLLER (Note 1)

Ref. No.	Part No.	Description
207	3-197-210-01	3RD LENS BLOCK GUIDE PIN
208	Selection parts	2ND LENS BLOCK GUIDE ROLLER (Note 1)
209	3-197-208-01	2ND LENS BLOCK GUIDE SPRING
210	3-197-201-01	2ND LENS BLOCK GUIDE BUSH
211	3-197-260-01	SCREW M1.7X7.0
212	A-1253-988-A	REAR BARREL ASSY

Ver. 1.2 2007.08

The changed portions from
Ver. 1.1 are shown in blue.

3-1-6. SELECTION PARTS

Ref. No. 101

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

<u>Part No.</u>	<u>Description</u>
2-683-641-01	COUPLER ADJUSTMENT WASHER A (t=0.05mm)
2-683-642-01	COUPLER ADJUSTMENT WASHER B (t=0.07mm)
2-683-643-01	COUPLER ADJUSTMENT WASHER C (t=0.10mm)
2-683-644-01	COUPLER ADJUSTMENT WASHER D (t=0.20mm)
2-683-645-01	COUPLER ADJUSTMENT WASHER E (t=0.50mm)

Ref. No. 104

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

<u>Part No.</u>	<u>Description</u>
2-683-648-01	BACK ADJUSTMENT WASHER A (t=0.05mm)
2-683-649-01	BACK ADJUSTMENT WASHER B (t=0.07mm)
2-683-650-01	BACK ADJUSTMENT WASHER C (t=0.10mm)
2-683-651-01	BACK ADJUSTMENT WASHER D (t=0.20mm)
2-683-652-01	BACK ADJUSTMENT WASHER E (t=0.50mm)

Ref. No. 206

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

<u>Part No.</u>	<u>Description</u>
3-197-211-01	3RD LENS BLOCK GUIDE ROLLER (D=4.81mm, d=4.61mm)
3-197-212-01	3RD LENS BLOCK GUIDE ROLLER (D=4.81mm, d=4.62mm)
3-197-213-01	3RD LENS BLOCK GUIDE ROLLER (D=4.81mm, d=4.63mm)
3-197-216-01	3RD LENS BLOCK GUIDE ROLLER (D=4.82mm, d=4.61mm)
3-197-217-01	3RD LENS BLOCK GUIDE ROLLER (D=4.82mm, d=4.62mm)
3-197-218-01	3RD LENS BLOCK GUIDE ROLLER (D=4.82mm, d=4.63mm)
3-197-219-01	3RD LENS BLOCK GUIDE ROLLER (D=4.83mm, d=4.61mm)
3-197-220-01	3RD LENS BLOCK GUIDE ROLLER (D=4.83mm, d=4.62mm)
3-197-221-01	3RD LENS BLOCK GUIDE ROLLER (D=4.83mm, d=4.63mm)

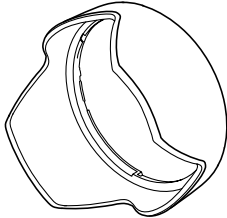
Ref. No. 208

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

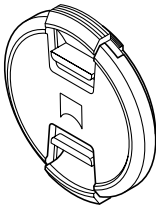
<u>Part No.</u>	<u>Description</u>
3-197-202-01	2ND LENS BLOCK GUIDE ROLLER (D=4.31mm)
3-197-203-01	2ND LENS BLOCK GUIDE ROLLER (D=4.32mm)
3-197-204-01	2ND LENS BLOCK GUIDE ROLLER (D=4.33mm)

3-2. SUPPLIED ACCESSORIES

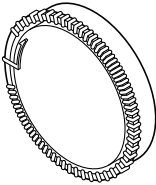
Checking supplied accessories.




Lens Hood (SH0005)
2-687-328-01



Front Lens Cap
X-2176-982-1



Rear Lens Cap
2-683-615-01



Lens Case
2-694-833-01

Other accessories

2-685-147-02 MANUAL, INSTRUCTION (JAPANESE, ENGLISH, FRENCH, SPANISH, SIMPLIFIED CHINESE)

2-685-147-11 MANUAL, INSTRUCTION (GERMAN, DUTCH, SWEDISH, ITALIAN) (AEP)

2-685-147-22 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
- Adhesive bond (B-60): J-6082-616-A
- Lens Adjustment Program (ActuatorChecker.exe)
- PC Card Setup File (InstaCal.exe)
- Color Calculator 2

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


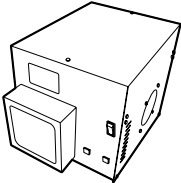

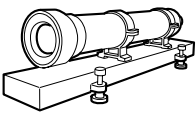
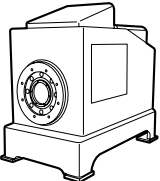
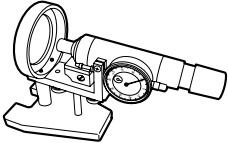
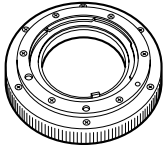
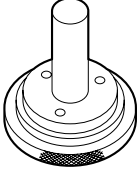
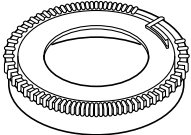
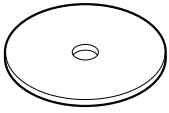
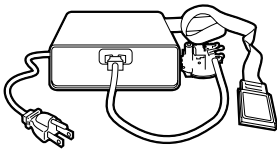
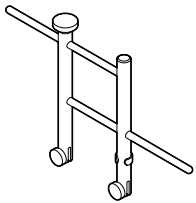
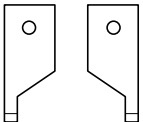
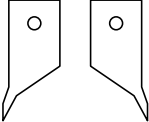
<p>J-1</p>  <p>Personal computer (Note 1)</p>	<p>J-2</p>  <p>Luminance box J-6082-581-A</p>	<p>J-3</p>  <p>AE master lens J-6082-597-A</p>
<p>J-4</p>  <p>1000 mm Collimator 110V: J-6082-604-A 240V: J-6082-604-B (Note 2)</p>	<p>J-5</p>  <p>Lens test projector J-6082-605-A (Note 3)</p>	<p>J-6</p>  <p>Flange back tester J-6082-606-A</p>
<p>J-7</p>  <p>A-mount attachment J-6082-607-A</p>	<p>J-8</p>  <p>Flange back gauge (43.50mm) J-6082-608-A</p>	<p>J-9</p>  <p>Maximum Aperture jig J-6082-640-A</p>
<p>J-10</p>  <p>Aberration measuring cap 62mm (SAL1680Z) J-6082-658-A</p>	<p>J-11</p>  <p>Finished Inspection JIG J-6082-645-A (Note 4)</p>	<p>J-12</p>  <p>Universal wrench J-6082-609-A</p>
<p>J-13</p>  <p>Chip-A for universal wrench: J-6082-609-1</p>	<p>J-14</p>  <p>Chip-B for universal wrench: J-6082-609-2</p>	

Fig. 4-1-1

Note 1: Personal Computer (PC)
(Color Calculator 2 installed)
OS: Windows 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.

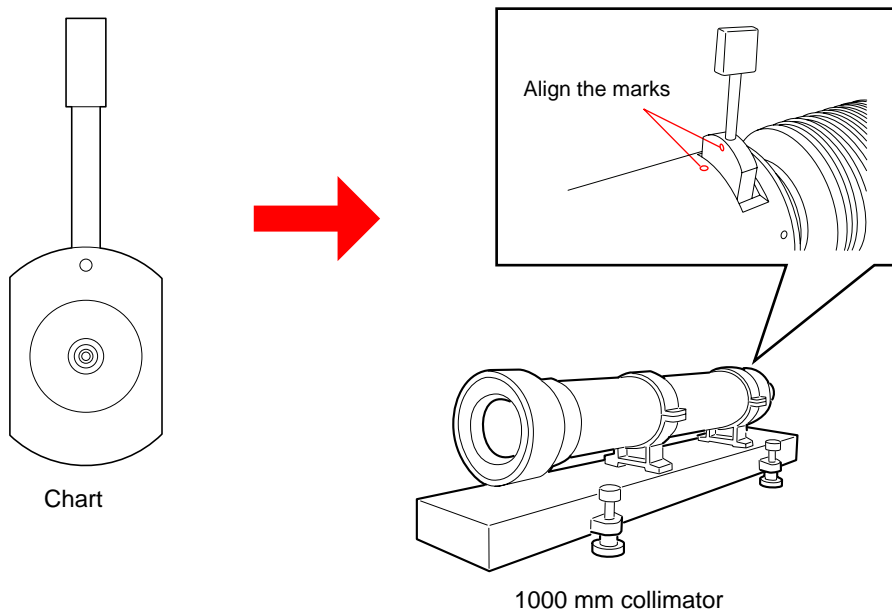


Fig. 4-1-2

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

Note 4: Finished Inspection JIG is **AC 100 V** only.

4-1-2. Lens Adjustment Program (ActuatorChecker)

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

4-7. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE (AMOUNT OF SPHERICAL ABERRATION))

4-9. LENS ROM CHECK

4-10. ZOOM BRUSH POSITION CHECK/ADJUSTMENT

4-11. FOCUS BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK

4-12. WRITE dSB

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

Equipment used

- Personal Computer
- Lens Adjustment Program (ActuatorChecker.Ver.x.x.x.x.zip)
- PC Card Setup File (InstaCal.zip)

Note 1: Lap top PC with PC card slot on which Windows XP runs

Note 2: Obtain the PC card setup file (InstaCal.zip) from the ESI homepage.

Note 3: Obtain the lens adjustment program (ActuatorChecker Ver. x.x.x.x.zip) from the ESI homepage.

1. Download of PC card setup file (InstaCal.exe)

- 1) Create the “MCC” folder in the C drive.

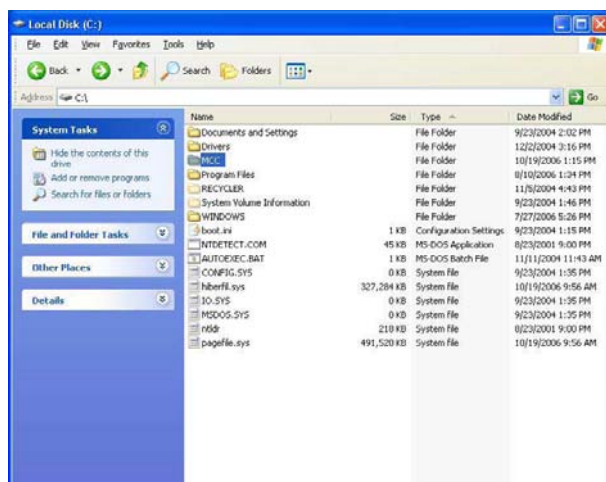


Fig.4-1-3

- 2) Download the file from Service Fixture and Software of ESI homepage, and save it in “C:\MCC”.
- 3) Double-click the downloaded file “InstaCal.exe” to extract it.
- 4) The window to specify the extract destination folder appears. Click **Browse...**.



Fig.4-1-4

- 5) Specify “C:\MCC” for the extract destination folder.

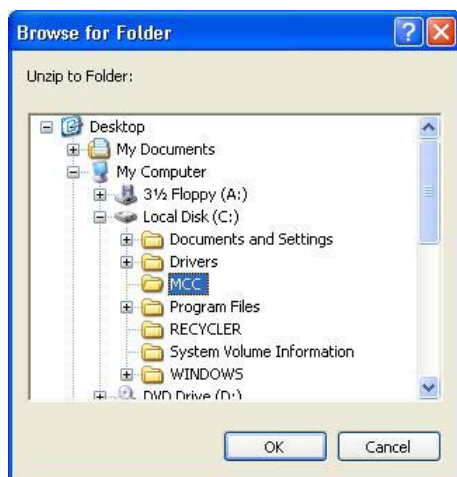


Fig.4-1-5

- 6) The window returns to the menu to specify the extract destination folder. Click **Unzip**.



Fig.4-1-6

- 7) When the window below appears, click **OK**.



Fig.4-1-7

- 8) Return to the menu to specify the extract destination folder. Then, click **Close** to close the window.

2. Setup of PC Card

- 1) Double-click “InstaCal.msi” in “C:\MCC” folder to begin the installation.

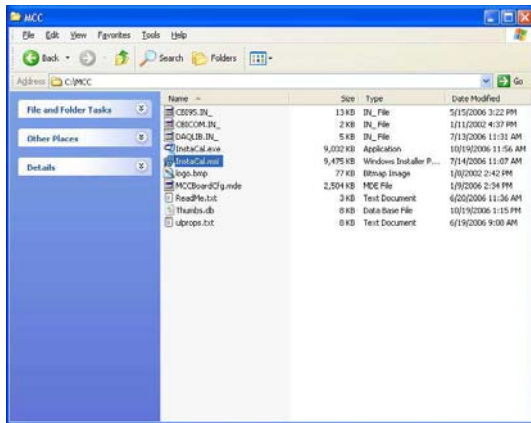


Fig.4-1-8

- 2) The menu to begin the installation appears. Click **Next>**.



Fig.4-1-9

- 3) Specify the install destination folder. As the default is used for it, click **Next>**.



Fig.4-1-10

- 4) The menu to tell that the wizard is ready to install appears. Click **Install**.



Fig.4-1-11

- 5) The installation is completed. Click **Finish**.

Note: To refer to the “readme” file, check the “Show the readme file” and click **Finish**.



Fig.4-1-12

- 6) To make the configuration installed effective, the window to prompt the restart appears. Click “Yes” to restart the PC.

Note: If a device is connected without restarting, the program may not work properly.

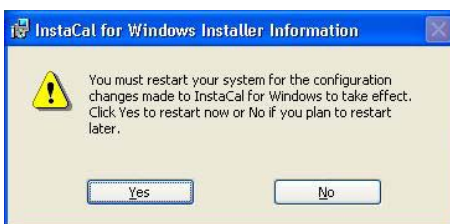


Fig.4-1-13

- 7) After restarting the PC, insert the PC-CARD-DIO48 in the PC card slot.
- 8) The software installation window appears.
Click “Install the software automatically. (Recommended)”.



Fig.4-1-14

- 9) The software is detected and installed. When the window below appears, click **Finish** to terminate the installation.



Fig.4-1-15

3. Confirmation of PC card setting

- 1) Select “All programs” - “MeasurementComputing” - “InstaCal” from the startup menu, and start up the software.

Note: Depending on the Windows setting, the window below may differ.

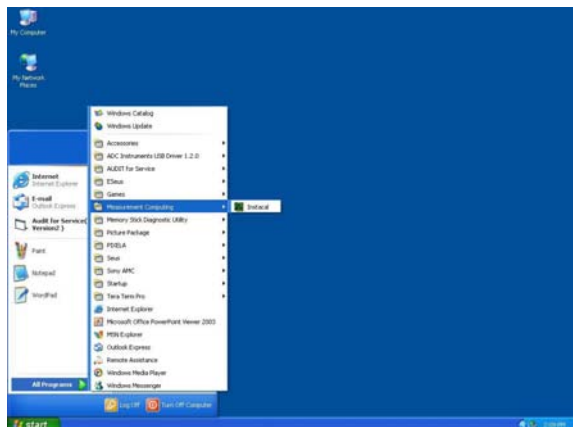


Fig.4-1-16

- 2) When “PC-CARD-DIO48” is detected, the window below appears. Confirm that the PC-CARD-DIO48” is checked.

Note: Depending on the slot inserted, the slot No. differs.



Fig.4-1-17

- 3) Confirm that “PC-CARD-DIO48” is recognized as “Board#0”.

Note: If not recognized as “Board#0”, the program does not work properly.

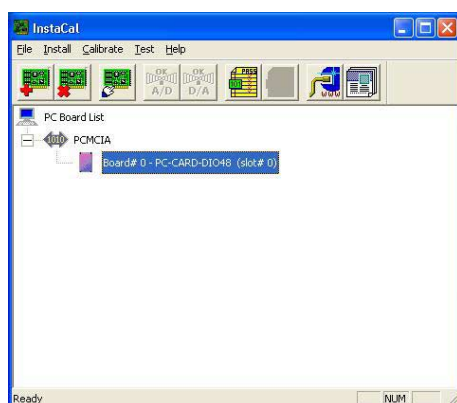


Fig.4-1-18

- 4) Click “File” - “Exit” to terminate “InstaCal”.

4. Startup of Lens Adjustment Program (ActuatorChecker.exe)

- 1) Download the file “ActuatorChecker VerX.X.X.X.zip” from Service Fixture and Software of ESI homepage, save and extract it.
- 2) Start up “ActuatorChecker.exe” from an arbitrary folder.
- 3) If “PC-CARD-DIO48” is properly installed, the window below appears.

Note: The version of “ActuatorCheker” might be updated.

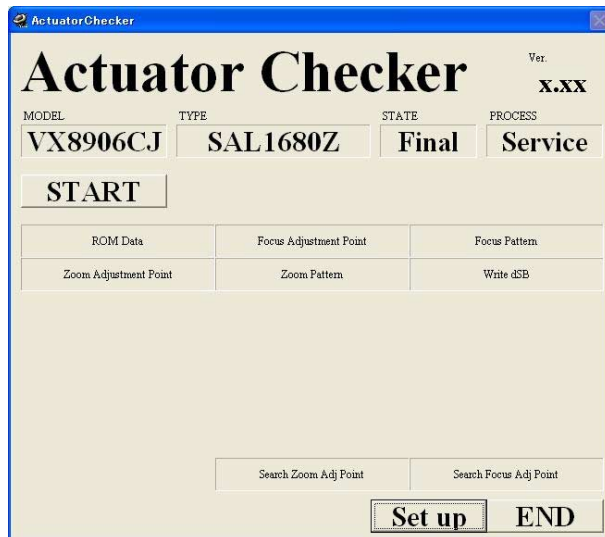


Fig.4-1-19

4-1-3. Connection of Finished Inspection JIG and Lens Adjustment Program (ActuatorChecker)

Note: Confirm “4-1-2. Lens Adjustment Program (ActuatorChecker)” has been completed before this procedure is executed.

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker.exe)

1. Connect equipment and checking lens as shown Fig.4-1-20.

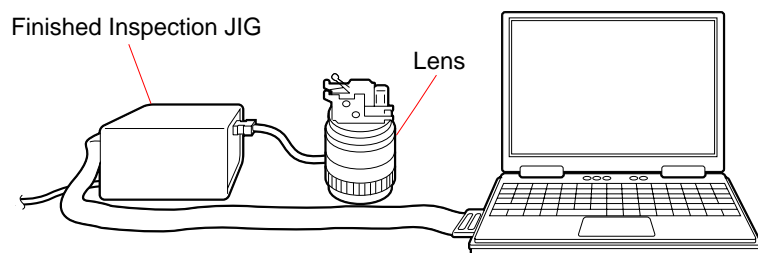


Fig.4-1-20

2. Turn on the finished inspection JIG.
3. Turn on the personal computer.
4. Start up “ActuatorChecker.exe” from an arbitrary folder, confirm that start up program normally.

Note: Turn off the finished inspection jig after use.

4-1-4. Initial Setting of “ActuatorChecker”

- 1. Start up “ActuatorChecker.exe”.

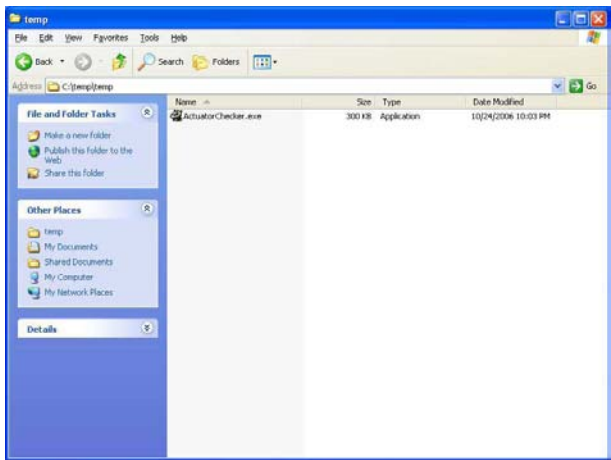


Fig.4-1-21

- 2. Depending on the initial startup or setting made at the previous startup, the window differs. When the English window appears, click the **Set up** button.

Note: When any button is clicked, the Serial window appears. The window to enter the lens serial number appears.

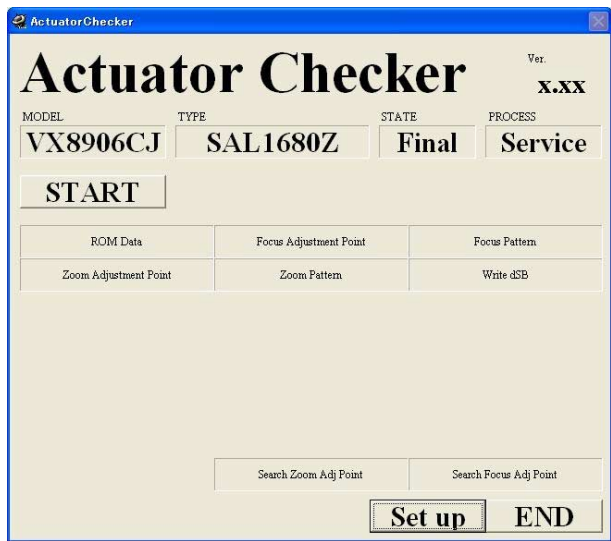


Fig.4-1-22

3. Set the following contents in the SETUP window.
 - MODEL Model to be adjustment this time
 - Language English
 - State FINAL
 - PROCESS SERVICE
4. Confirm that all of the items are set, and click **[OK]**.

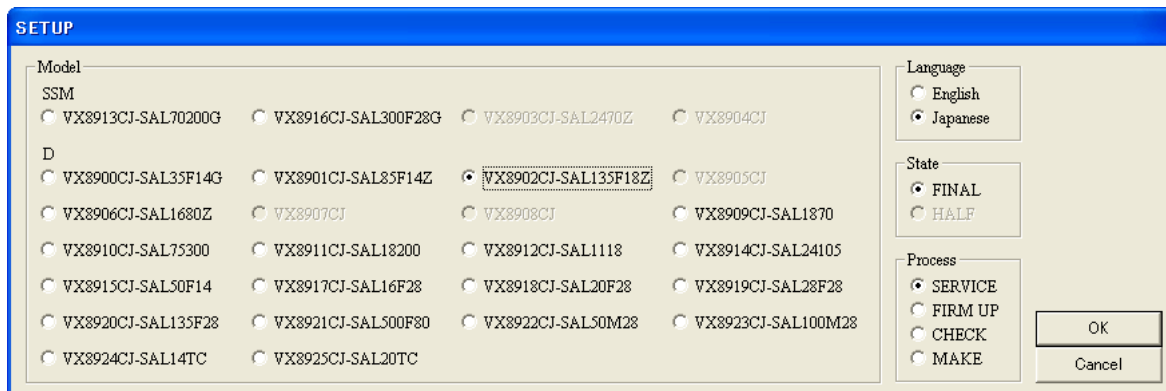


Fig.4-1-23

4-1-5. About Inspection Procedure of Lens Adjustment Program (ActuatorChecker)

The inspection method has the method of executing the method of inspecting the corresponding model as everything continues and the inspection of each item one by one.

Click **[START]** from the start up window when you inspect the corresponding model as everything continues.

The procedure for executing the inspection of each item one by one has been described in this manual.

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

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

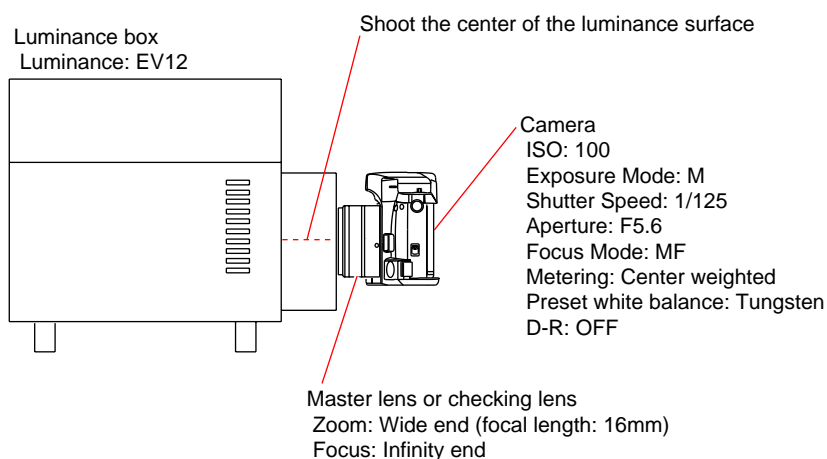


Fig.4-2-1

- 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: 16mm)

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.

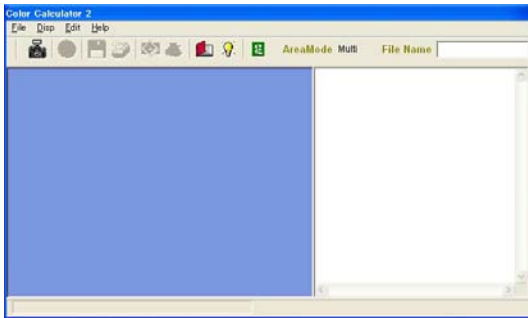


Fig.4-2-2

- 2) Read the image from the file menu.

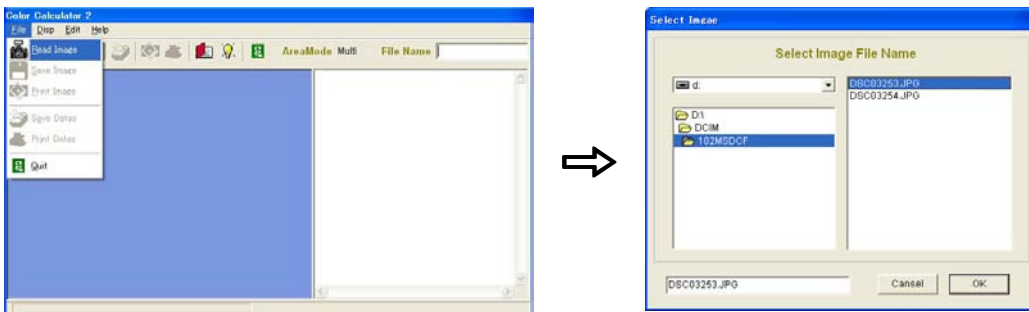


Fig.4-2-3

- 3) Set the Color Calculator 2 as follows.

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

Measuring method (Display menu): Center Single Area

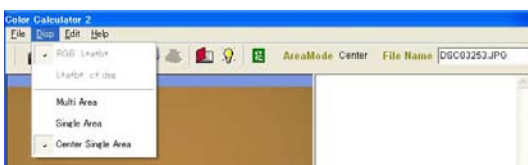


Fig.4-2-4

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)

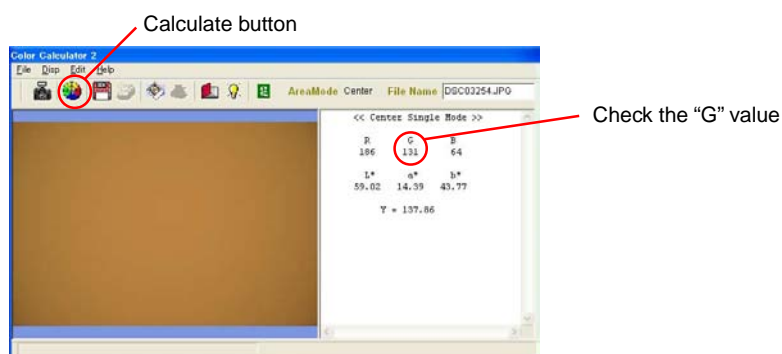


Fig.4-2-7

3. Checking Method

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

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

Specification

Aperture error = -20 to +5 (Wide end: 16mm)

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

4-2-2. Aperture Diameter Adjustment

Since the aperture blades remain a little in the optical path when the lens is set to the open F value, the aperture diameter changes when zoom-operated. Therefore, adjust in the procedure below.

Equipment

- Adhesive bond (B-10)
- Maximum Aperture Jig
- Universal Wrench
- Chip-A for Universal Wrench
- Chip-B for Universal Wrench

1. Preparation

- 1) Remove parts indicated in Fig.4-2-8 from the lens unit.
- 2) Set the zoom to 80mm.
- 3) Install the maximum aperture jig and open the aperture.

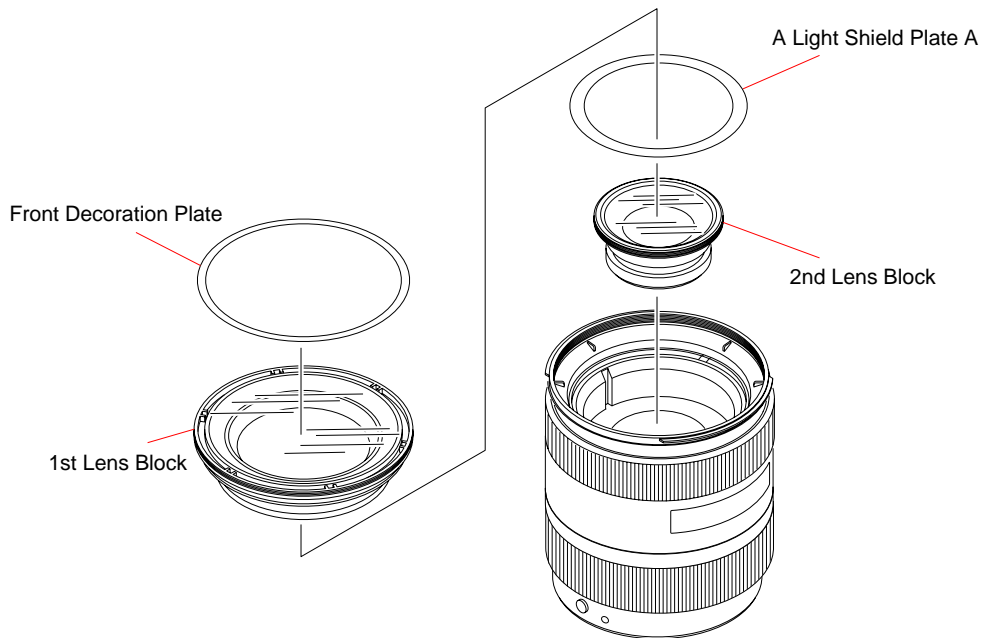


Fig.4-2-8

2. Adjustment Procedure

- 1) Rotate the aperture block from the lens front so that the aperture blades are hidden behind the aperture hold ring.(Fig.4-2-9)
- 2) Remove the maximum aperture jig once. Then, install the maximum aperture jig again and confirm the position of aperture blades.
- 3) Confirm the aperture tolerance. Repeat the confirmation and adjustment until the aperture tolerance meets the specification.
- 4) After completing the adjustment, apply the adhesive bond (B-10) to the three indicated locations.(Fig.4-2-9)

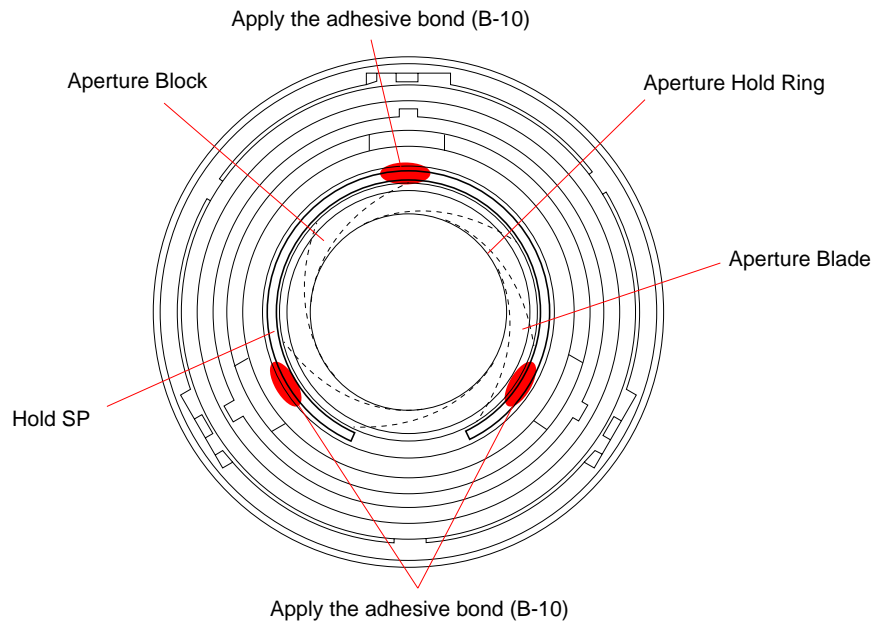


Fig.4-2-9

4-3. PROJECTIVE RESOLVING POWER CHECK/ADJUSTMENT

4-3-1. Projective Resolving Power Adjustment

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)
35	1.4
80	3.2

Table 4-3-1

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

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

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

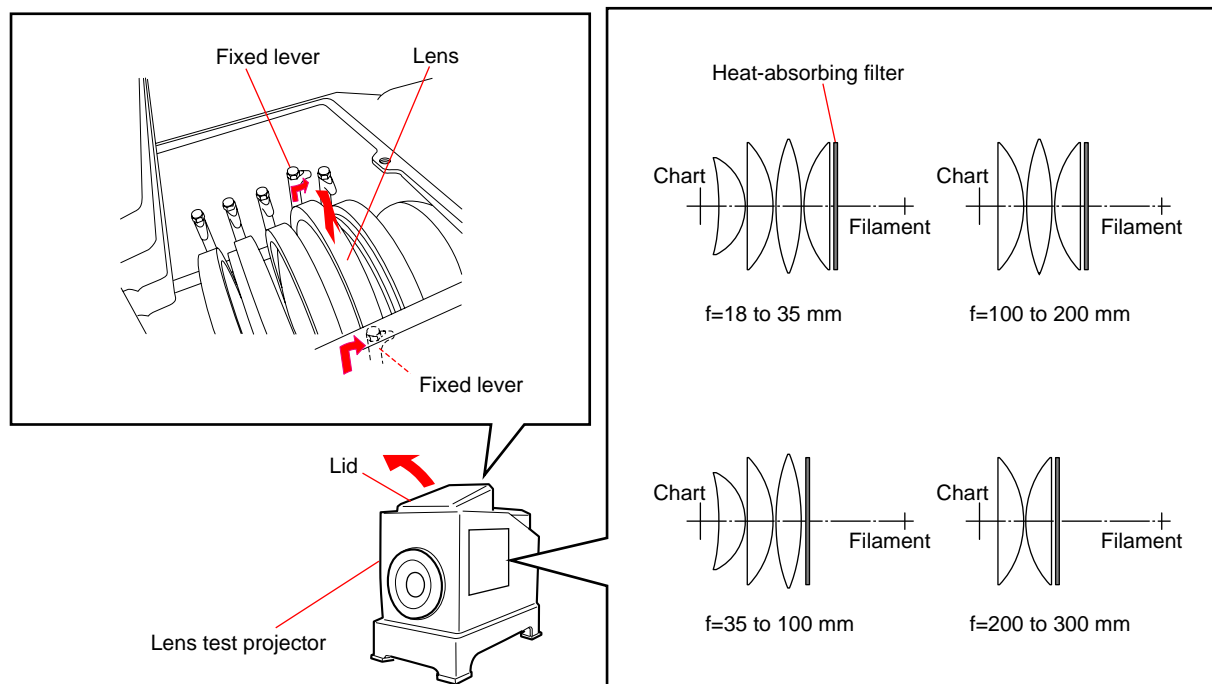


Fig.4-3-1

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

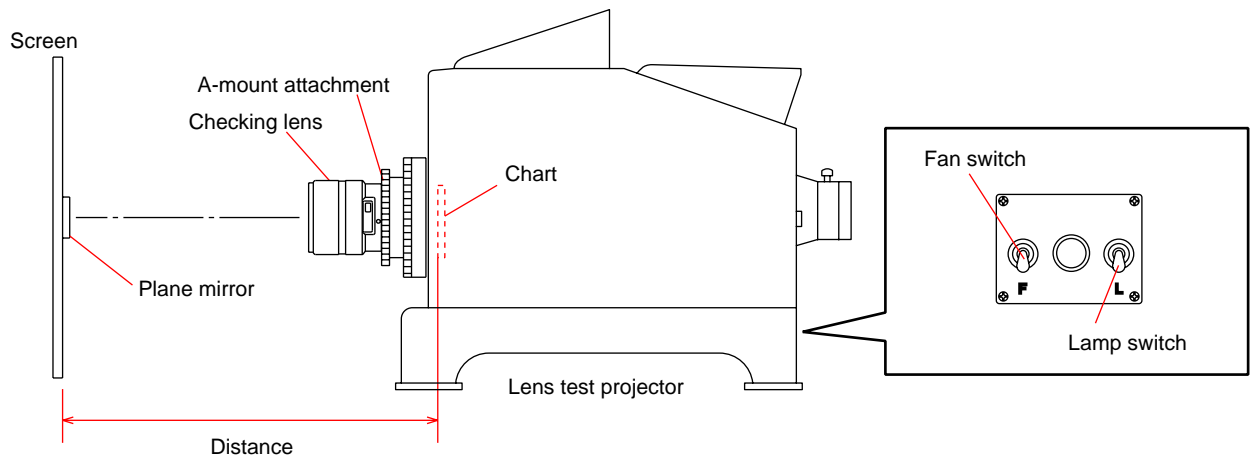


Fig.4-3-2

- 4) Turn the 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 ($y'=0$).

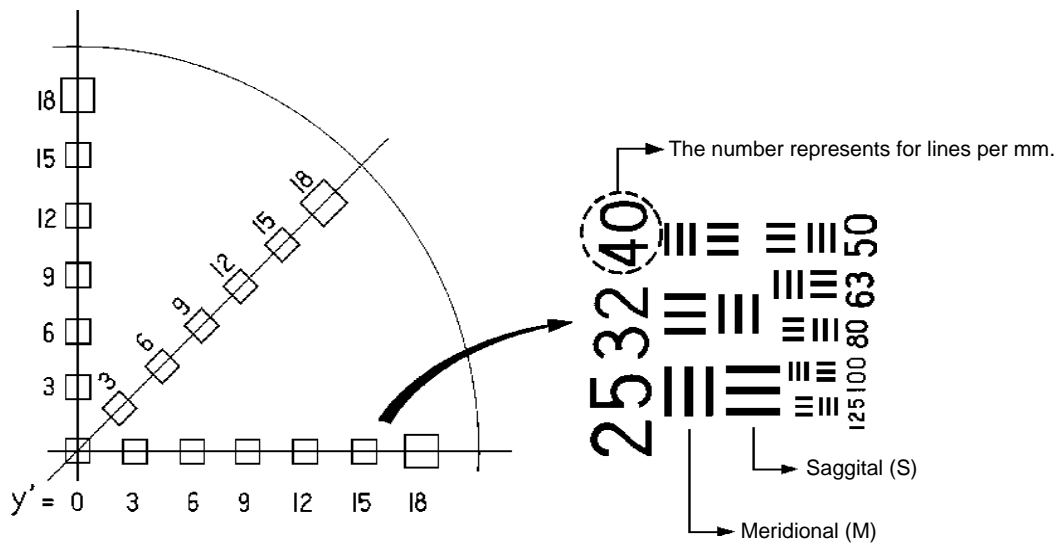


Fig.4-3-3

- 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.

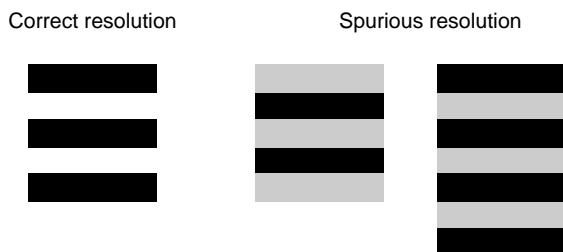


Fig.4-3-4

- 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) (Lines per mm)	y' = 9 (Lines per mm)		y' = 12 (Lines per mm)	
			S	M	S	M
35	1.4	125 or greater	63 or greater	50 or greater	50 or greater	40 or greater
80	3.2	125 or greater	63 or greater	50 or greater	40 or greater	40 or greater

Table 4-3-2

4-3-2. Projective Resolving Power Check

Note: • Check the projective resolving power. If it does not meet the specification, adjust the projective resolving power, projective resolving power (partial blur) adjustment meet the specifications respectively.

Projective Resolving Power (Partial Blur) Adjustment

Check the projective resolving power. Conform the following adjustment if necessary.

- 1) Set the focal length of lens to 80 mm and adjust the focus so that the center “ $y' = 0$ ” reaches the maximum resolution.
- 2) Check projective resolving power at reach peripheral point of “ $y' = 12$ ”.

If the projective resolving power does not meet the specification, perform the following.

- (1) Rotate the 4th lens block, adjust the defective parts to out of picture frame.
- (2) If the adjustment is impossible according to the procedure (1), replace the 4th lens block.
- (3) If the specification is not improved according to procedure (2), replace the 2nd lens block.

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.

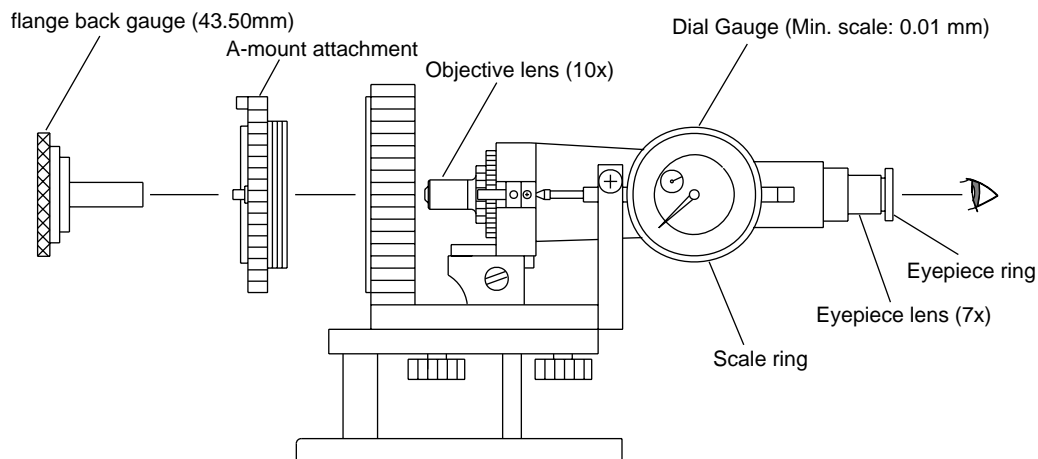


Fig.4-4-1

- 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.

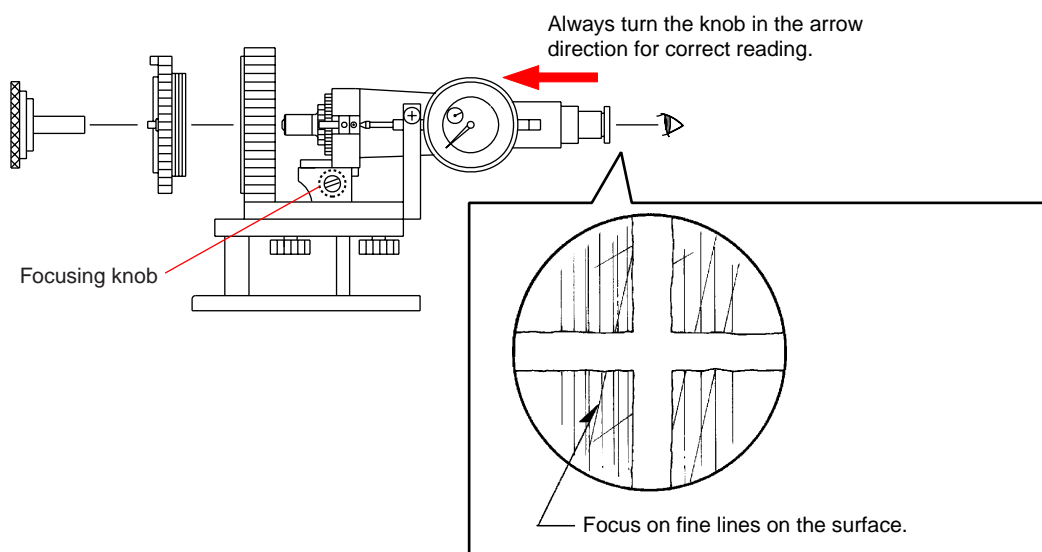


Fig.4-4-2

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

Note: This position is the flange back (f'F) = 43.50 mm.

Memorize the position of short-pointer.

2. Flange Back (f'F) Check

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

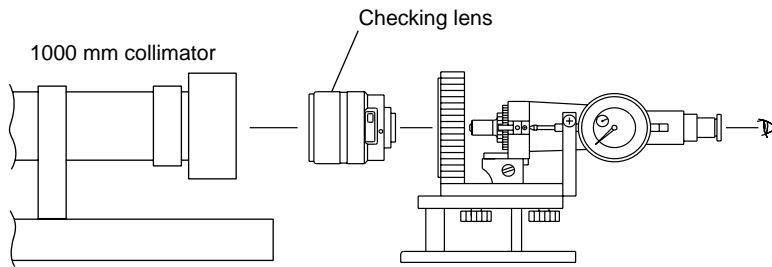


Fig.4-4-3

- 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.

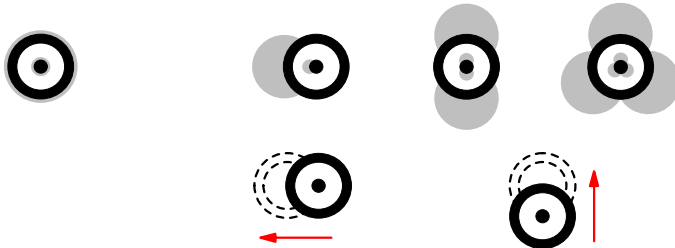


Fig.4-4-4

3. Checking Method

- 1) 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

f (mm)	f'F (mm)
16	44.56 to 44.68
24	44.54 to 44.85
35	44.56 to 44.85
50	44.56 to 44.80
80	44.56 to 44.70

Table 4-4-1

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

Equipment

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

Note: Perform the flange back value (f'F) adjustment after completing “4-5. FOCUS-SHIFT (BY ZOOMING) CHECK/ADJUSTMENT”.

1. Adjustment Procedure

- 1) Perform “4-4-1. Flange back (f'F) Check” and confirm that the flange back value (f'F) of lens to be checked does not meet the specification in Table 4-4-1.
- 2) Set the focus of lens to be checked to the infinite end.
- 3) Viewing the microscope, turn the knob of flange back tester to focus.
- 4) Using the formula below, calculate the shift amount (X).

Shift amount (X) = f'F (measured value) with focal length “24 mm” at the infinite end - 44.62 mm
--

X = Shift amount to be adjusted by the back adjustment washer

- 5) According to the result in step 4), adjust the thickness of back adjustment washer

Note: Measure the thickness of back adjustment washer with a micrometer (or a caliper). (Refer to Table 4-4-2.)

- In case of negative value (-) of shift amount (X), make the back adjustment washer thinner by x.
- In case of positive value (+) of shift amount (X), make the back adjustment washer thicker by x.

Back Adjustment Washer

Part No.	Description	thickness(mm)
2-683-648-01	BACK ADJUSTMENT WASHER A	0.05
2-683-649-01	BACK ADJUSTMENT WASHER B	0.07
2-683-650-01	BACK ADJUSTMENT WASHER C	0.10
2-683-651-01	BACK ADJUSTMENT WASHER D	0.20
2-683-652-01	BACK ADJUSTMENT WASHER E	0.50

Table 4-4-2

- 6) Select the coupler adjustment washer of the thickness as back adjustment washer, and replace the coupler adjustment washer.

Coupler Adjustment Washer

Part No.	Description	thickness(mm)
2-683-641-01	COUPLER ADJUSTMENT WASHER A	0.05
2-683-642-01	COUPLER ADJUSTMENT WASHER B	0.07
2-683-643-01	COUPLER ADJUSTMENT WASHER C	0.10
2-683-644-01	COUPLER ADJUSTMENT WASHER D	0.20
2-683-645-01	COUPLER ADJUSTMENT WASHER E	0.50

Table 4-4-3

- 7) Insert the back adjustment washer, and perform “4-4-1. Flange back (f'F) Check”.

4-5. FOCUS-SHIFT (BY ZOOMING) CHECK/ADJUSTMENT

In this section, the check and adjustment of change amount of focused point caused by the change of focal length are described.

Equipment

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

1. Preparation

- 1) Remove parts indicated in Fig.4-5-1 from the lens unit
- 2) Execute “1. Preparation” of “4.1.1 Flange Back (f’F) Check”.

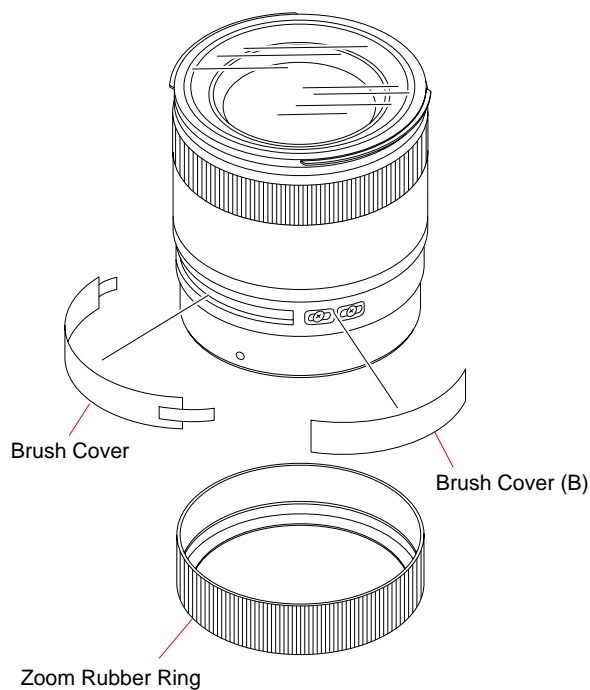


Fig.4-5-1

2. Adjustment Procedure

- 1) Set the zoom to 16mm.
- 2) Set the focus ring to the ∞ (infinity) end.
- 3) Rotate the knob of flange back tester to achieve good focus.
- 4) Rotate the knob of flange back tester until it reaches the position where the value shows the displayed numeral of dial gauge + 0.02.
- 5) Set the zoom to 80mm.
- 6) Rotate the focus ring to achieve good focus.
- 7) Loosen two screws fixing the focus stopper and set the focus stopper in the arrow direction while holding the focus ring by hand not to move. Then, tighten two screws.
- 8) Repeat steps 1) to 7) until the amount of focus-shift is within 0.02mm.
- 9) After completing the adjustment, apply the adhesive bond (B-10) to the locations shown in the figure.

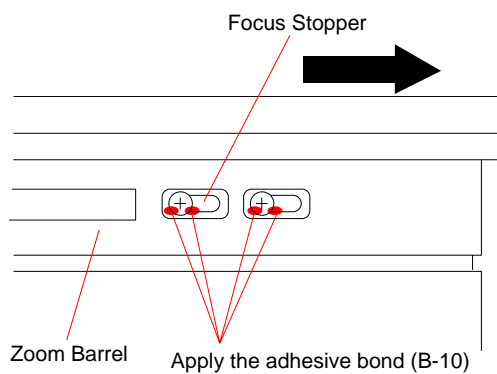


Fig.4-5-2

4-6. FOCUS SCALE PLATE, POSITION ADJUSTMENT

Equipment

Adhesive bond (B-60)

Note: The focus-shift adjustment/flange back adjustment should be completed.

1. Preparation

- 1) Remove parts indicated in Fig.4-6-1 from the lens unit.

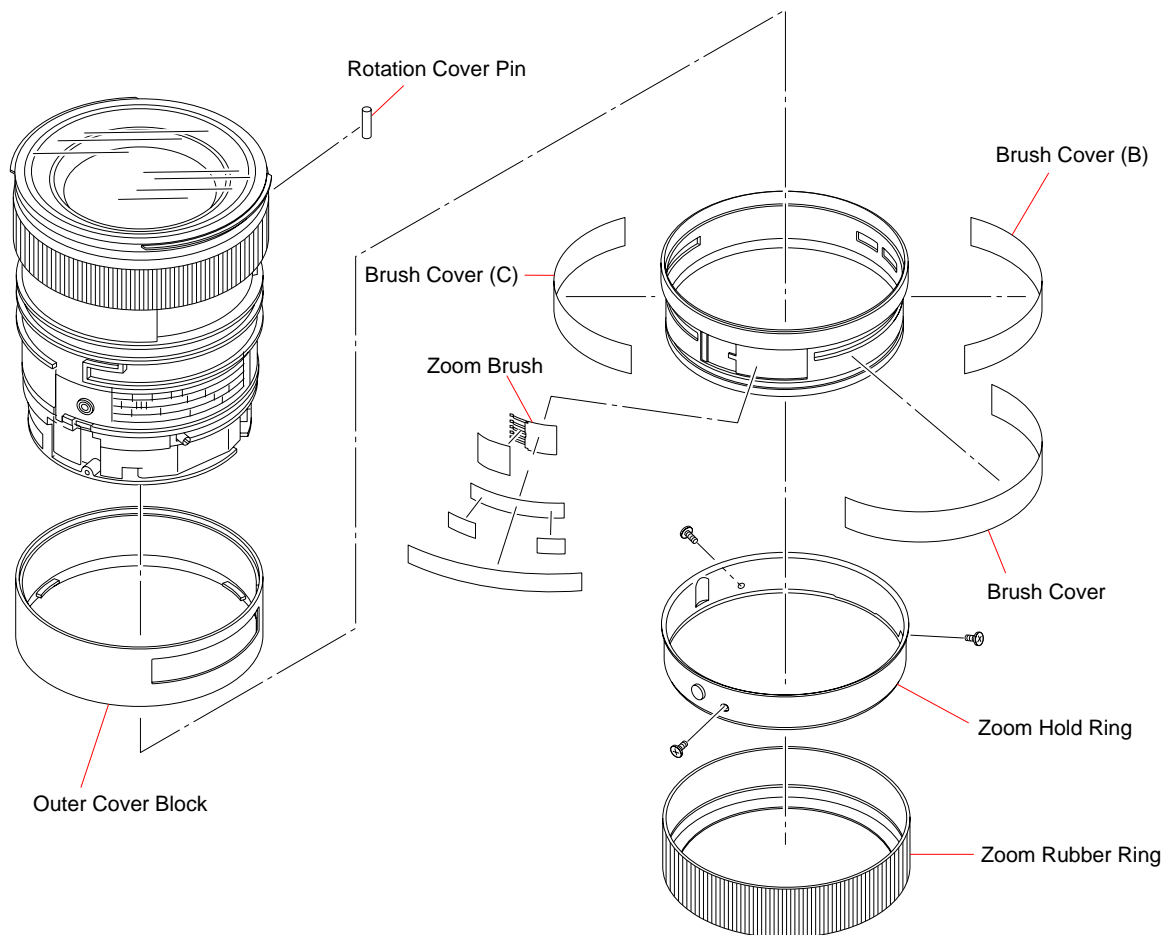


Fig.4-6-1

2. Adjustment Procedure

- 1) Set the focus ring to the infinity end by rotating the focus ring.
- 2) By moving the focus scale plate by finger align the ∞ mark on the focus scale plate with the projection of outer barrel.
- 3) Apply the adhesive bond (B-10) to the hole of focus scale plate in the hole of outer barrel as shown in the figure.

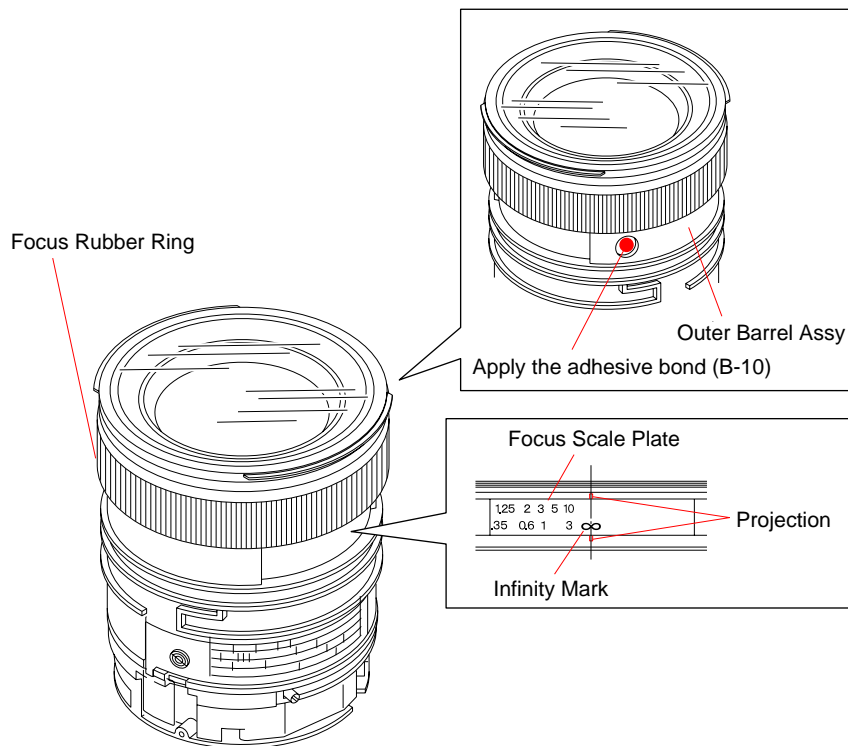


Fig.4-6-2

4-7. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE (AMOUNT OF SPHERICAL ABERRATION))

This section describes the check/adjustment of focus-shift amount resulting change of focal-length by aperture setting.

Equipment

- 1000 mm Collimator
- Flange Back Tester
- A-mount Attachment
- Flange Back Gauge (43.50mm)
- Aberration measuring cap 62mm (SAL1680Z)

1. Preparations

- 1) Perform “1. Preparations” of “4-4-1. Flange Back (f’F) Check”.
- 2) Set the checking lens focus to the infinite.
- 3) Set the focal length 80mm.

2. Checking Method

- 1) Set the lens aperture to the open aperture position, and measure the flange back (f’F).
- 2) Set the aberration measuring cap 62mm on the tip of lens as shown in the Fig.4-7-1, then measure the flange back (f’F).

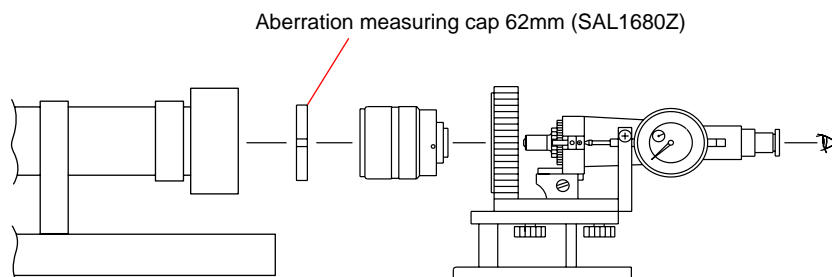


Fig.4-7-1

- 3) Calculate amount of focus-shift using the following formula, and check that the specification is satisfied.

Note: The focus-shift amount of the checking lens is difference between the flange back (f’F) of open aperture and flange back (f’F) reading (using aberration measuring cap 62mm).

$$\text{Focus-shift} = \text{Flange back (f’F) reading (using aberration measuring cap 62mm)} - \text{flange back (f’F) of open aperture reading}$$

Specification

Focus-shift (mm) = - 0.12 to +0.09

- 4) Perform the “4-12. WRITE dSB”.

4-8. TORUQE ADJUSTMENT OF MF OPERATION RING

Equipment

Adhesive bond (B-60)

1. Preparation

Remove the focus rubber ring from the lens unit.

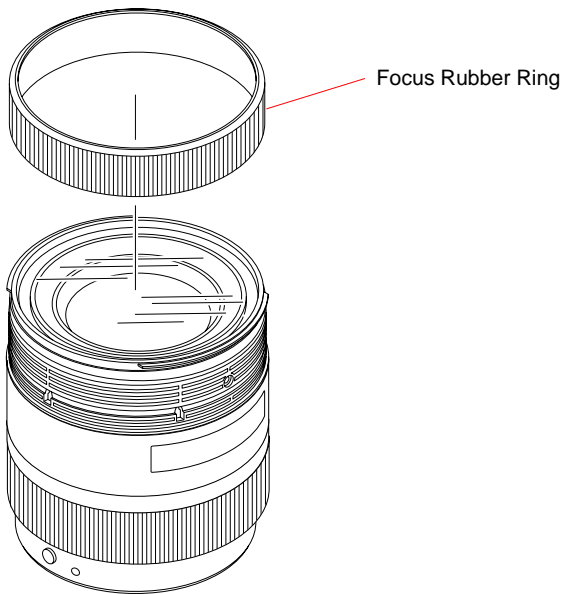


Fig.4-8-1

2. Adjustment Procedure

- 1) Hold the lower part of MF operation ring by hand and rotate it counterclockwise by 1.5 turns.
- 2) Apply the bond (B-60) in width of 10mm to three locations (120 degrees apart each) where the MF operation ring contacts to the outer barrel as shown in the figure.

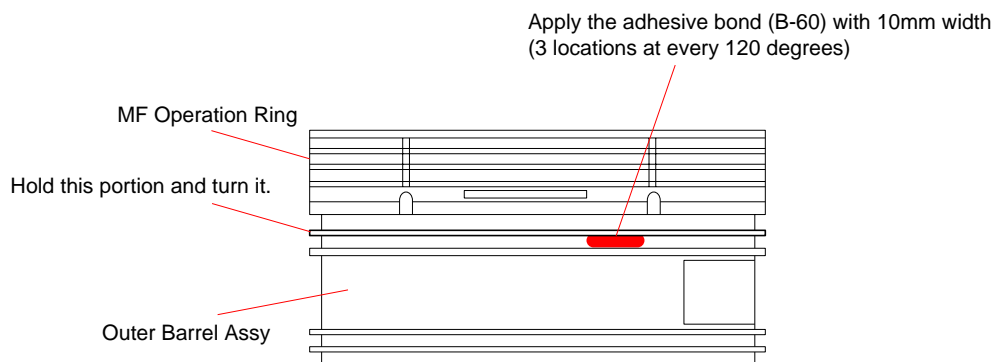


Fig.4-8-2

- 3) Hold the lower part of MF operation ring by hand and rotate it clockwise to tighten it to the lens unit.
- 4) When rotating the MF operation ring, confirm that the focus scale plate moves following the MF operation ring.
When rotating the coupler at the lens mount side with a screwdriver, confirm that the MF operation ring does not rotate.
If these two items are not met the specifications simultaneously, adjust the extent of tightening of MF operation ring to the lens unit in step 3.

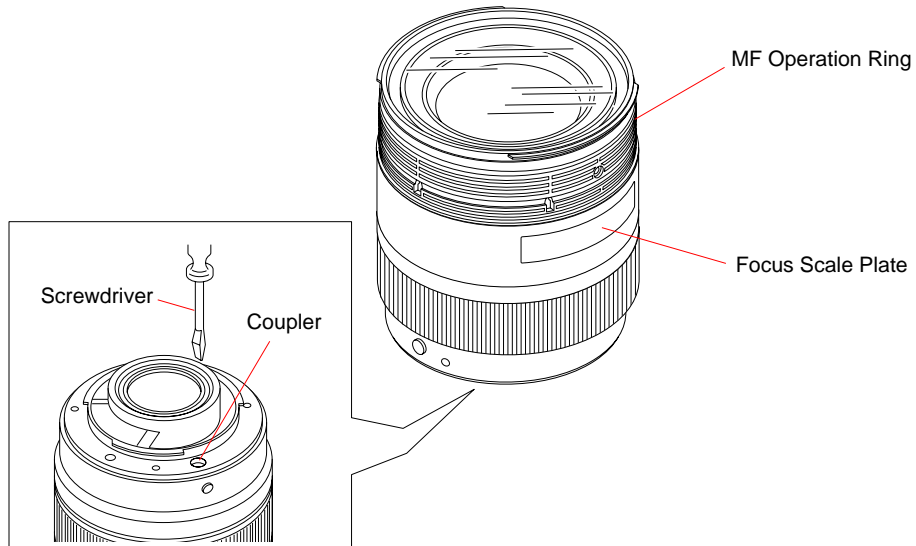


Fig.4-8-3

4-9. LENS ROM CHECK

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker”.
- 3) Click **Set up**, and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click **ROM Data**.

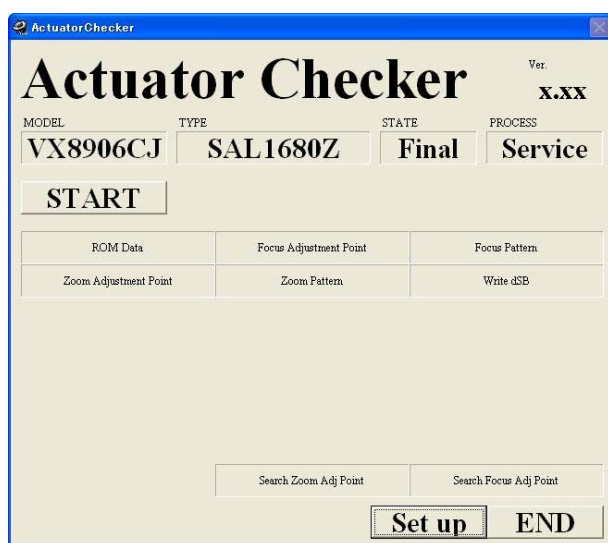


Fig.4-9-1

- 2) The Serial window appears. Input the lens serial number.

Note: When **OK** is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.



Fig.4-9-2

- 3) The message “Move FOCUS to Infinity, ZOOM to TELE position. Then push [ENTER].” is displayed on the pop-up window. Set the focus to the infinity, zoom to tele position and press down the ENTER key.

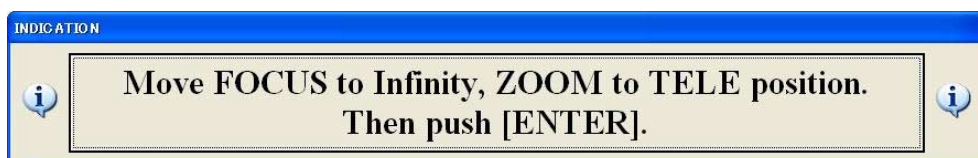


Fig.4-9-3

- 4) When “OK” is displayed on the pop-up window, press the ENTER key to return to the initial window.

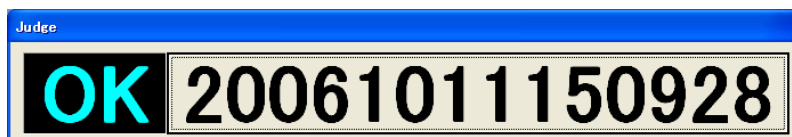


Fig.4-9-4

3. In case of error display in the ROM Data

- 1) When the error display and the NG display appear to the pop up window, press the ENTER key to return to the initial window, and perform “2. Checking Method” again.

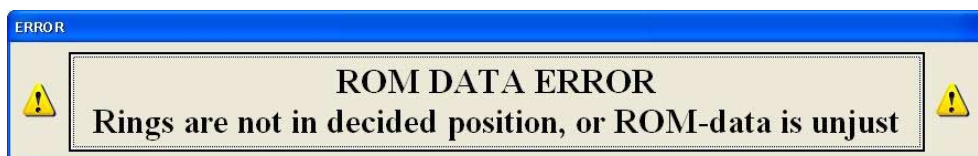


Fig.4-9-5

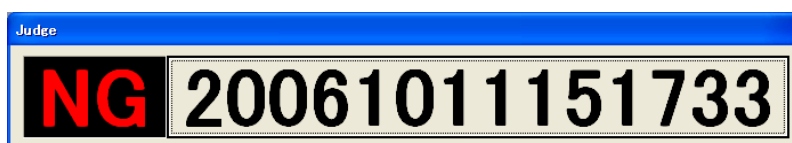


Fig.4-9-6

- 2) Although focus is positioned at the infinity position and zoom is positioned at the tele position, if the “NG” appears, confirm or perform the following.
 - 4-10-1. Zoom Brush Position Adjustment (Search Zoom Adjustment Point)
 - 4-11-1. Focus Brush Position Adjustment (Search Focus Adjustment Point)
 - Cleaning of flexible pattern or the brush.
 - Replacing the brush.
 - Replacing the main flexible unit.
- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

4-10. ZOOM BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK

4-10-1. Zoom Brush Position Adjustment (Search Zoom Adjustment Point)

Equipment

- Personal Computer (PC)
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program

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

1. Preparations

- 1) Remove parts indicated in Fig.4-10-1 from the lens unit.

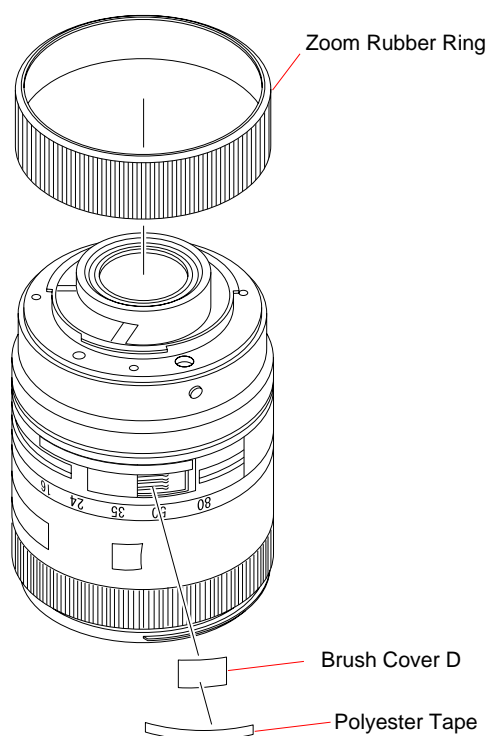


Fig.4-10-1

- 2) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 3) Start up of "ActuatorChecker.exe".
- 4) Click **Set up**, and perform the initial setting. (Refer to Section 4-1-4.)

2. Adjusting Method

- 1) Set the zoom to “Tele end”.
- 2) Peel off the polyester tape.

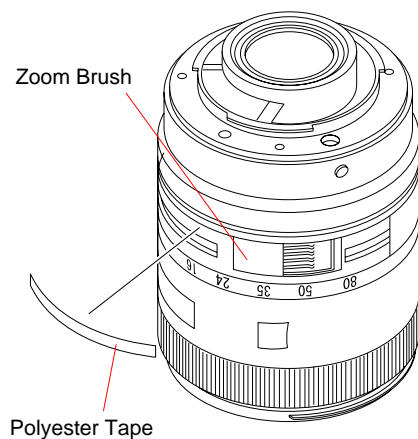


Fig.4-10-2

- 3) Click the Search Zoom Adj Point.

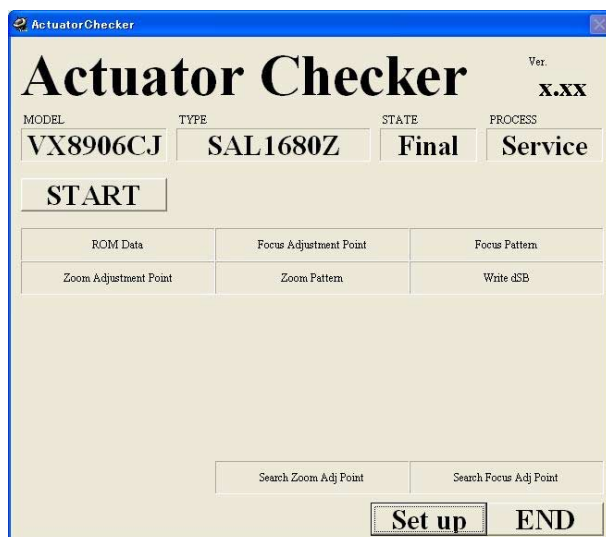


Fig.4-10-3

Note: Move the brush right and left to adjust. At this moment, be careful not to shift the position by shock when touching to the zoom.

- 4) The message “If Zoom-Adjustment-Point is found, Buzzer sounds”. is displayed on the pop-up window. Search the position where the sound beeps by turning the lens to the infinity position.

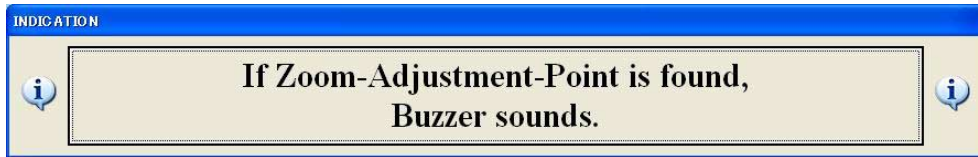


Fig.4-10-4

- 5) Fix firmly the zoom brush with the tape (A) as shown in Fig. 4-10-2.
6) Perform “4-10-2. Zoom Brush Position Check” and “4-10-3. Zoom Brush Pattern Check”

3. In case of error display in the Search Zoom Adjustment Point

- 1) When the error display and the NG display appear to the pop-up window, press the ENTER key to return to the initial window, and perform “2. Adjusting Method” again.

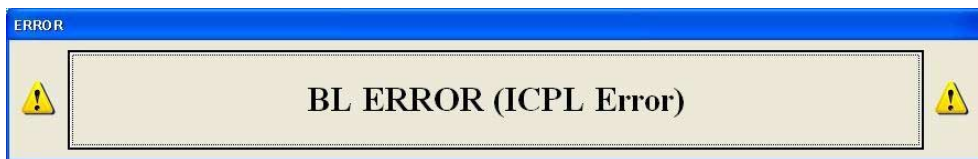


Fig.4-10-5

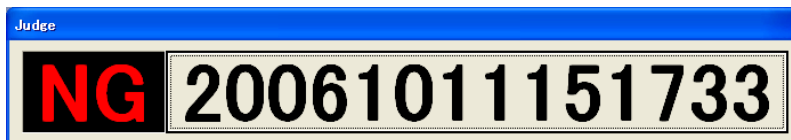


Fig.4-10-6

- 2) If the “NG” appears again, thought cause communication error of the finished inspection JIG and checking lens, confirm or perform the following.
- Deformation of zoom brush.
 - Grime of pattern.
 - Grime of contact flexible.
 - Improper connection of connector.
 - Improper of BL contact.
 - Disconnection of mirror box fixture.

4-10-2. Zoom Brush Position Check (Zoom Adjustment Point)

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker.exe”.
- 3) Click [Set up], and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click the [Zoom Adjustment Point].

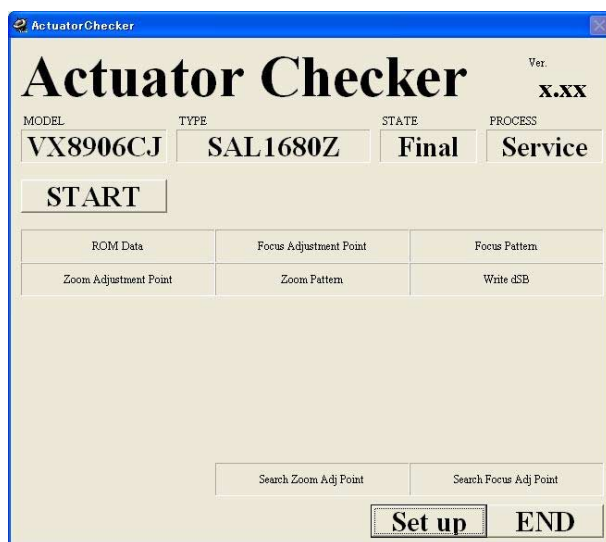


Fig.4-10-7

- 2) The Serial window appears. Input the lens serial number.

Note: When [OK] is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.

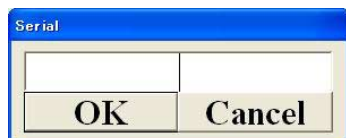


Fig.4-10-8

- 3) The message “Move ZOOM to WIDE position. Then push [ENTER].” is displayed on the pop-up window. Set the zoom to the wide position and press down the ENTER key.

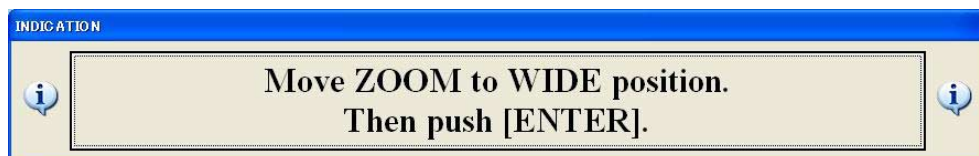


Fig.4-10-9

- 4) When the wide position check finishes normally, the message “Move ZOOM to TELE position. Then push [ENTER].” is displayed on the pop-up window.

Set the zoom to the tele position and press down the ENTER key.

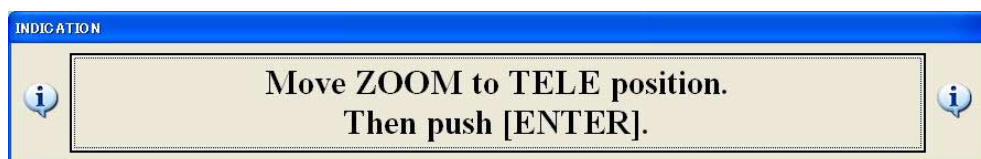


Fig.4-10-10

- 5) When the tele position check finishes normally, “OK” is displayed on the pop-up window, and press the ENTER key to return to the initial window.

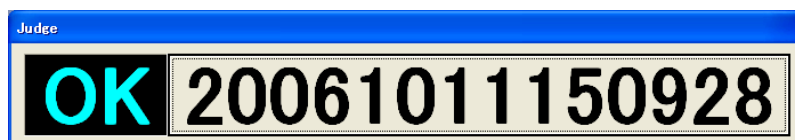


Fig.4-10-11

3. In case of error display in the Zoom Adjustment Point

- 1) When the error display and the NG display appear to the pop up window, press the ENTER key to return to the initial window, and perform “2. Checking Method” again.
 - In case of error at the wide position in the Zoom Adjustment Point

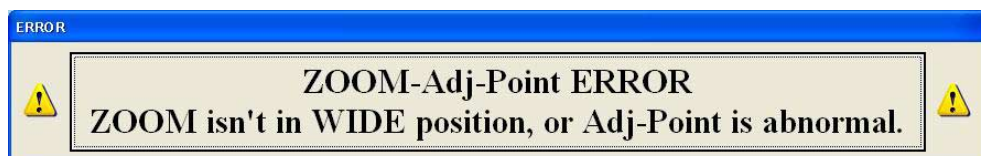


Fig.4-10-12

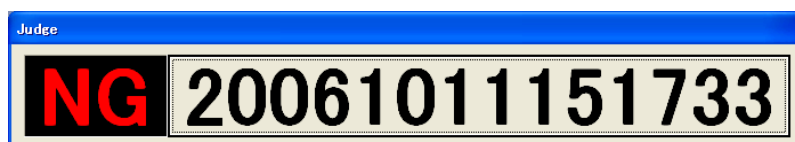


Fig.4-10-13

- In case of error at the tele position in the Zoom Adjustment Point

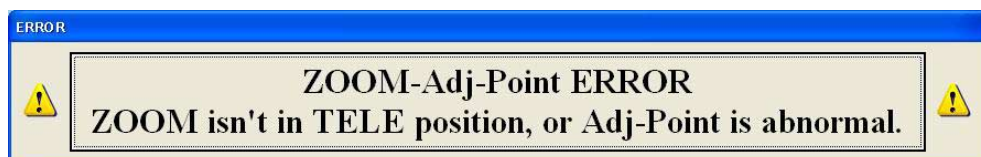


Fig.4-10-14

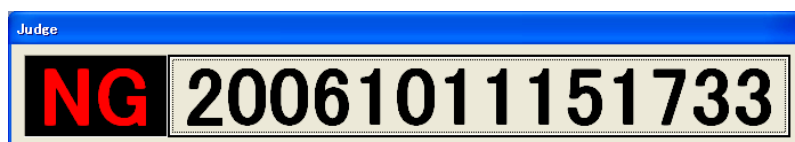


Fig.4-10-15

- 2) Although the lens is positioned at the tele position or the infinity position, if “NG” appears, confirm or perform the following.
 - 4-10-1. Zoom Brush Position Adjustment (Search Zoom Adjustment Point)
 - Cleaning of flexible pattern or the brush.
 - Replacing the brush.
- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

4-10-3. Zoom Brush Pattern Check (Zoom Brush Pattern)

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker.exe”.
- 3) Click [Set up], and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click the [Zoom Pattern].

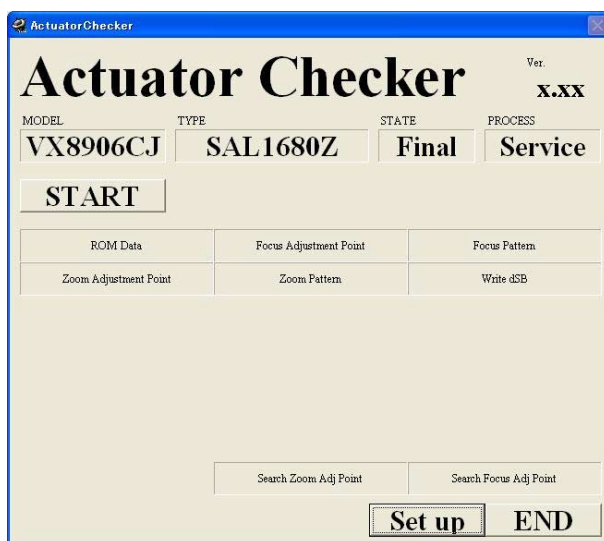


Fig.4-10-16

- 2) The Serial window appears. Input the lens serial number.

Note: When [OK] is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.

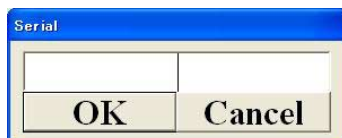


Fig.4-10-17

- 3) The message “Move ZOOM to TELE position. Then push [ENTER].” is displayed on the pop-up window. Set the zoom to the tele position and press down the ENTER key.

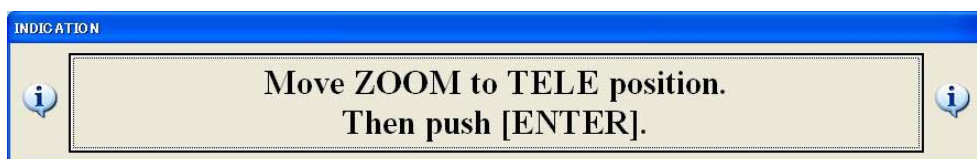


Fig.4-10-18

- 4) When the tele position check finishes normally, the message “Move ZOOM to WIDE position at about 10sec.” is displayed on the pop-up window.

Set the zoom to the wide position and press down the ENTER key.



Fig.4-10-19

- 5) When the wide position check finishes normally, the message “Reverse ZOOM to TELE position at about 10sec.” is displayed on the pop-up window.

Set the zoom to the tele position and press down the ENTER key.



Fig.4-10-20

- 6) When the infinity position check finishes normally, “OK” is displayed on the pop-up window, and press the ENTER key to return to the initial window.

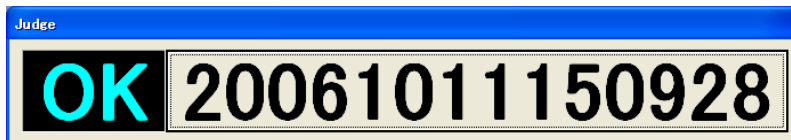


Fig.4-10-21

3. In case of error display in the Zoom Pattern (Tele position (first try))

- 1) When the error display and the NG display appear to the pop-up window, press the ENTER key to return to the initial window, and perform “2. Checking Method” again.

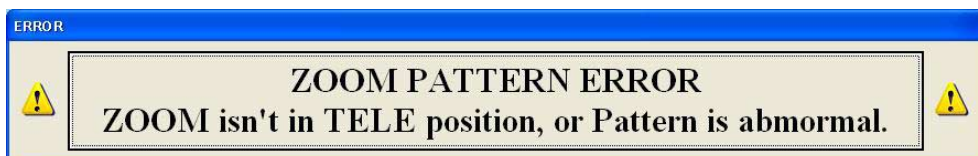


Fig.4-10-22

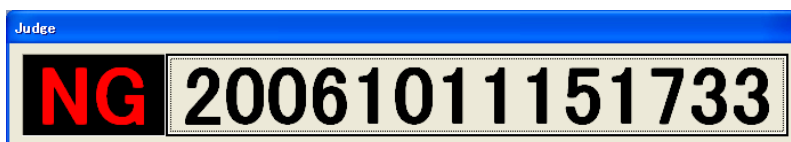


Fig.4-10-23

- 2) Although the lens is positioned at the tele position, if “NG” appears, confirm or perform the following.
- 4-10-1. Zoom Brush Position Adjustment (Search Zoom Adjustment Point)
 - Cleaning of flexible pattern or the brush.
 - Replacing the brush.
 - Rotating operation error of the focus ring (rotation speed is not suitable at a regulated speed.).
- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

4. In case of error display in the Zoom Pattern (WIDE position)

- 1) When the error display and the NG display appear to the pop-up window, perform the work with caution so that setting the lens to the wide position can be done in more than 5 seconds and no more than 10 seconds.
 - When the zoom pattern error



Fig.4-10-24

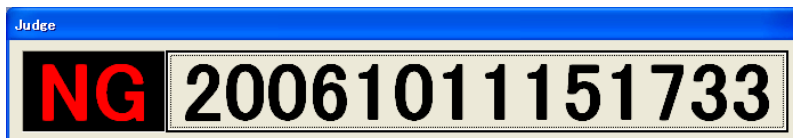


Fig.4-10-25

- When the lens does not reach the wide end infinity position seconds.

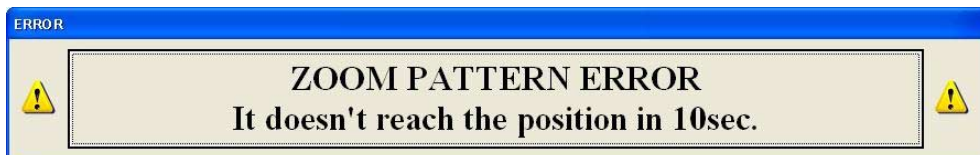


Fig.4-10-26

- 2) Perform "2. Checking Method" again, repeat the inspection until "OK" appears on the pop-up window.

5. In case of error display in the Zoom Pattern (TELE position (second try))

- 1) When the error display and the NG display appear to the pop-up window, perform the work with caution so that setting the lens to the tele position can be done in more than 5 seconds and no more than 10 seconds.
 - When the zoom pattern error



Fig.4-10-27

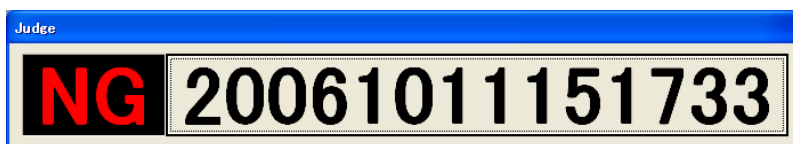


Fig.4-10-28

- When the lens does not reach the tele end infinity position seconds.

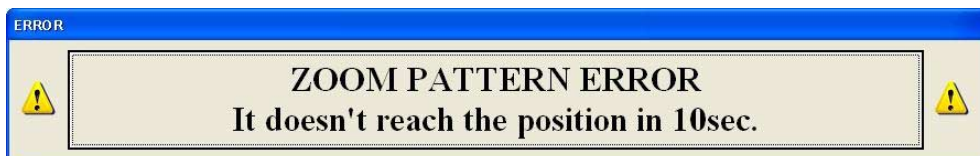


Fig.4-10-29

- 2) Perform "2. Checking Method" again, repeat the inspection until "OK" appears on the pop-up window.

4-11. FOCUS BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK

4-11-1. Focus Brush Position Adjustment (Search Focus Adjustment Point)

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker)
- Adhesive bond (B-10)

1. Preparations

- 1) Remove the zoom rubber ring and zoom hold ring from the lens unit.

Note: After removing the zoom hold ring, do not move the zoom barrel in the arrow direction. If moved, the zoom brush will be deformed.

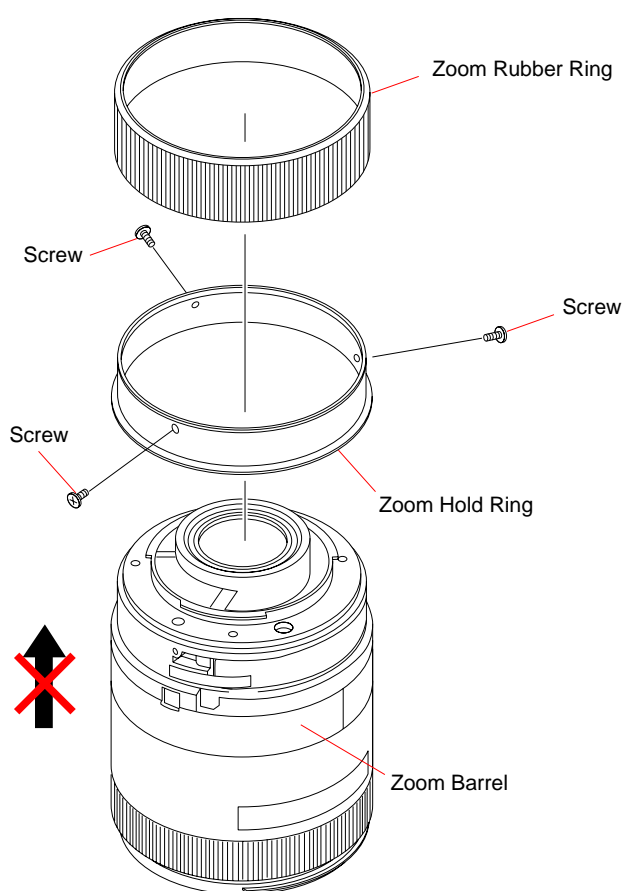


Fig.4-11-1

- 2) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 3) Start up of “ActuatorChecker.exe”.
- 4) Click [Set up], and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Set the focus to the ∞ end and zoom to the wide end.
- 2) Peel off the polyester tape shown in Fig.4-10-2 and open a little the main flexible unit with tweezers. Then, loosen two screws fixing the focus brush.

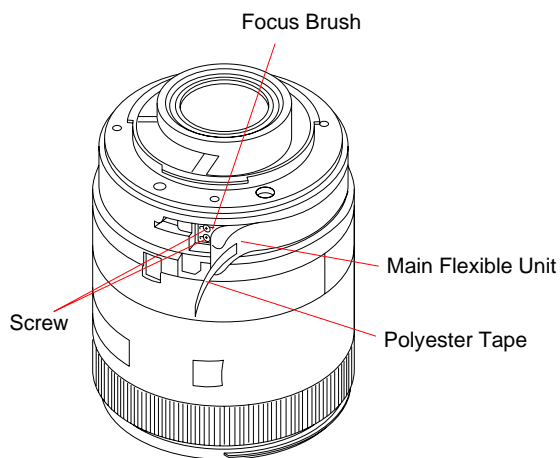


Fig.4-11-2

- 3) Click the **Search Focus Adj Point**.

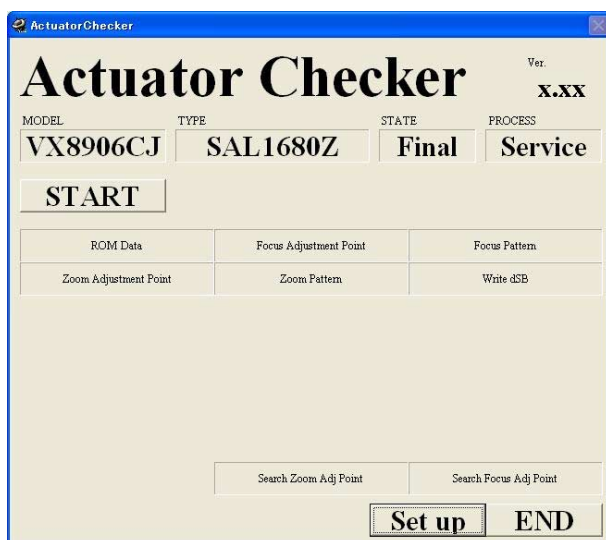


Fig.4-11-3

- 4) The message “If Focus-Adjustment-Point is found, Buzzer sounds”. is displayed on the pop-up window. Search the position where the sound beeps by turning the lens to the infinity position.

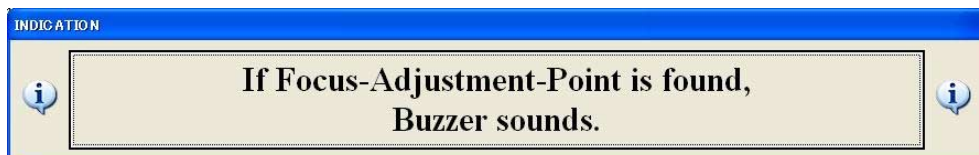
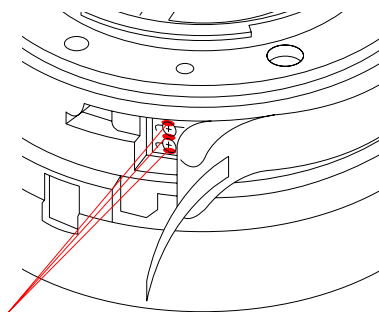


Fig.4-11-4

- 5) At the position where the sound beeps, tighten two screws loosened, apply the adhesive bond (B-10) to the screws.



Apply the adhesive bond (B-10)

Fig.4-11-5

- 6) Perform “4-11-2. Focus Brush Position Check” and “4-11-3. Focus Brush Pattern Check”

3. In case of error display in the Search Focus Adjustment Point

- 1) When the error display and the NG display appear to the pop-up window, press the ENTER key to return to the initial window, and perform “2. Adjusting Method” again.

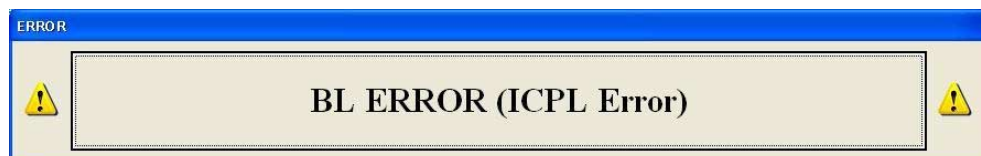


Fig.4-11-6

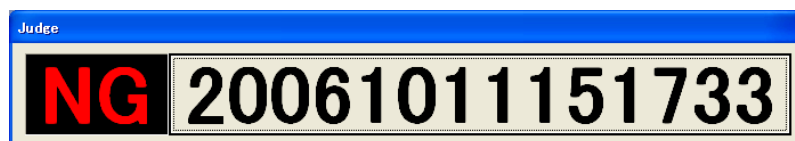


Fig.4-11-7

- 2) If the “NG” appears again, thought cause communication error of the finished inspection JIG and checking lens, confirm or perform the following.
- Deformation of focus brush.
 - Grime of pattern.
 - Grime of contact flexible.
 - Improper connection of connector.
 - Improper of BL contact.
 - Disconnection of mirror box fixture.

4-11-2. Focus Brush Position Check (Focus Adjustment Point)

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker.exe)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker.exe”.
- 3) Click [Set up], and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click the [Focus Adjustment Point].

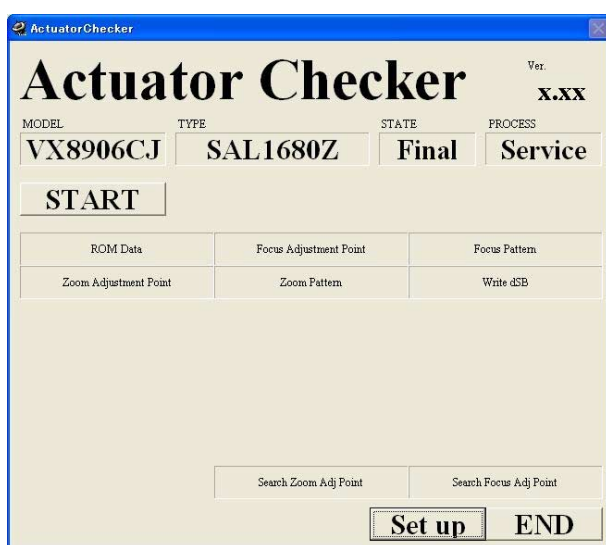


Fig.4-11-8

- 2) The Serial window appears. Input the lens serial number.

Note: When [OK] is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.

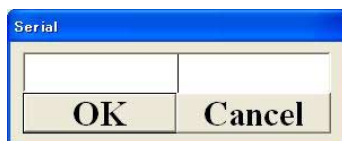


Fig.4-11-9

- 3) The message “Move FOCUS to Near position. Then push [ENTER].” is displayed on the pop-up window. Set the focus to the near position and press down the ENTER key.

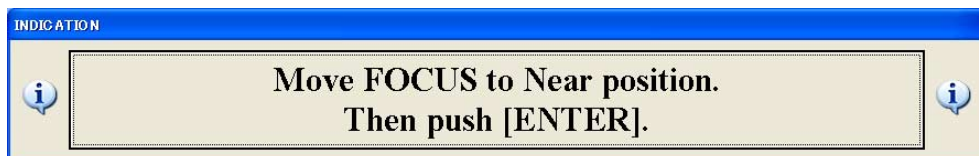


Fig.4-11-10

- 4) When the near position check finishes normally, the message “Move FOCUS to Infinity position. Then push [ENTER].” is displayed on the pop-up window.

Set the focus to the infinity position and press down the ENTER key.

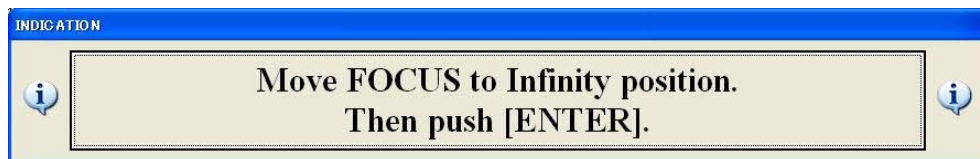


Fig.4-11-11

- 5) When the infinity position check finishes normally, “OK” is displayed on the pop-up window, and press the ENTER key to return to the initial window.

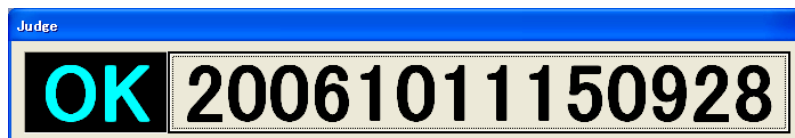


Fig.4-11-12

3. In case of error display in the Focus Adjustment Point

- 1) When the error display and the NG display appear to the pop up window, press the ENTER key to return to the initial window, and perform “2. Checking Method” again.
 - In case of error at the near position in the Focus Adjustment Point

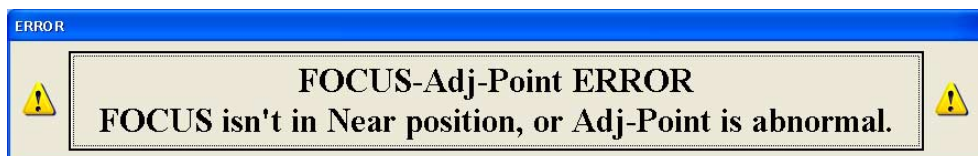


Fig.4-11-13

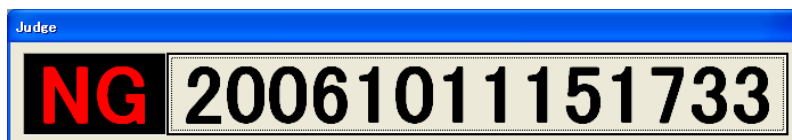


Fig.4-11-14

- In case of error at the infinity position in the Focus Adjustment Point

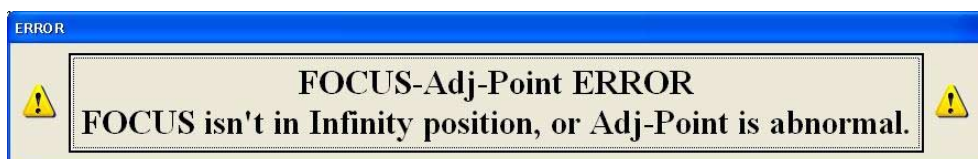


Fig.4-11-15

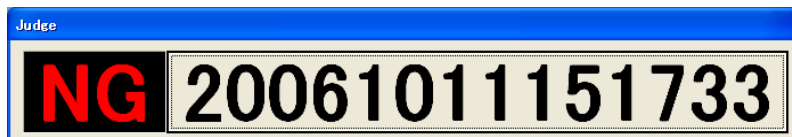


Fig.4-11-16

- 2) Although the lens is positioned at the near position or the infinity position, if “NG” appears, confirm or perform the following.
 - 4-11-1. Focus Brush Position Adjustment (Search Focus Adjustment Point)
 - Cleaning of flexible pattern or the brush.
 - Replacing the brush.

- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

SAL1680Z (Vario-Sonnar DT 3.5-4.5/16-80 ZA) (Vario-Sonnar T* DT 16-80mm F3.5-4.5 ZA)

4-11-3. Focus Brush Pattern Check (Focus Pattern)

Equipment

- Personal Computer
- Finished Inspection JIG (AC100 V only)
- Lens Adjustment Program (ActuatorChecker)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker.exe”.
- 3) Click **[Set up]**, and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click the **[Focus Pattern]**.

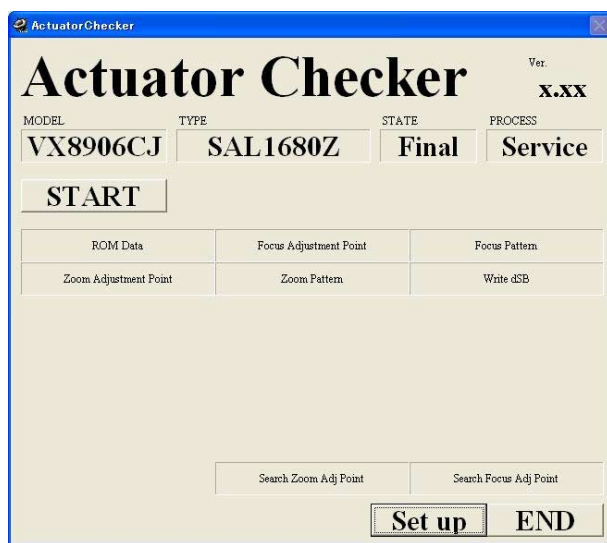


Fig.4-11-17

- 2) The Serial window appears. Input the lens serial number.

Note: When **[OK]** is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.

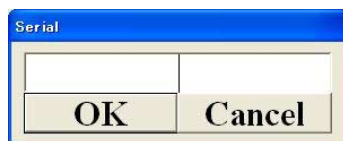


Fig.4-11-18

- 3) The message “Move FOCUS to Infinity position. Then push [ENTER].” is displayed on the pop-up window. Set the focus to the infinity position and press down the ENTER key.

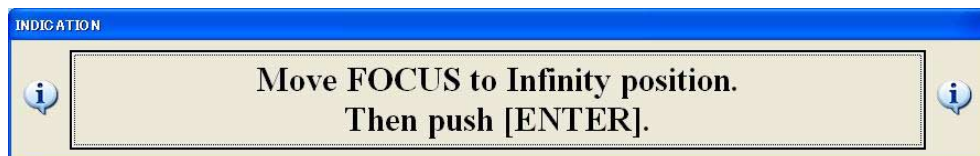


Fig.4-11-19

- 4) When the infinity position check finishes normally, the message “Move FOCUS to Near position at about 5sec.” is displayed on the pop-up window.

Set the focus to the near position and press down the ENTER key.



Fig.4-11-20

- 5) When the near position check finishes normally, the message “Reverse FOCUS to Infinity position at about 5sec.” is displayed on the pop-up window.

Set the focus to the infinity position and press down the ENTER key.

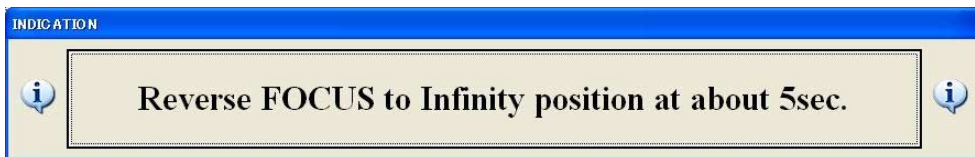


Fig.4-11-21

- 6) When the infinity position check finishes normally, “OK” is displayed on the pop-up window, and press the ENTER key to return to the initial window.

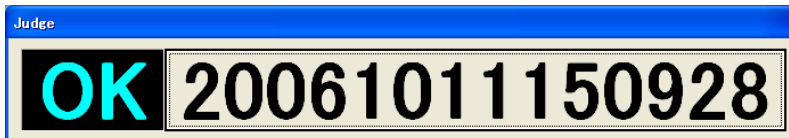


Fig.4-11-22

3. In case of error display in the Focus Pattern (infinity position (first try))

- 1) When the error display and the NG display appear to the pop-up window, press the ENTER key to return to the initial window, and perform “2. Checking Method” again.

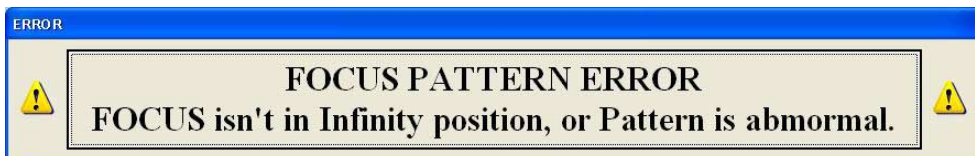


Fig.4-11-23

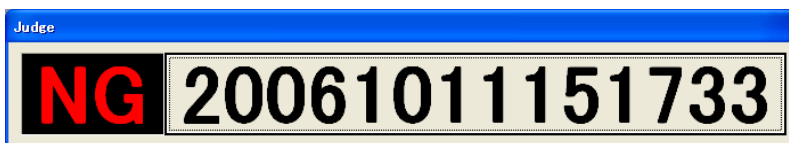


Fig.4-11-24

- 2) Although the lens is positioned at the infinity position, if “NG” appears, confirm or perform the following.
- 4-11-1. Focus Brush Position Adjustment (Search Focus Adjustment Point)
 - Cleaning of flexible pattern or the brush.
 - Replacing the brush.
 - Rotating operation error of the focus ring (rotation speed is not suitable at a regulated speed.).
- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

4. In case of error display in the Focus Pattern (near position)

- 1) When the error display and the NG display appear to the pop-up window, perform the work with caution so that setting the lens to the near position can be done in more than 5 seconds and no more than 10 seconds.
 - When the focus pattern error

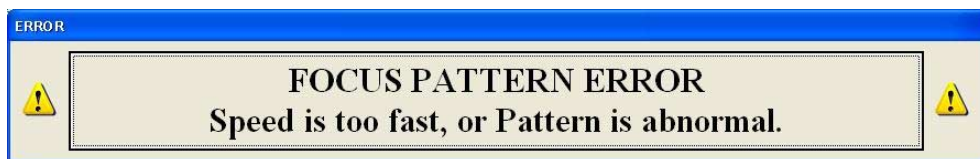


Fig.4-11-25

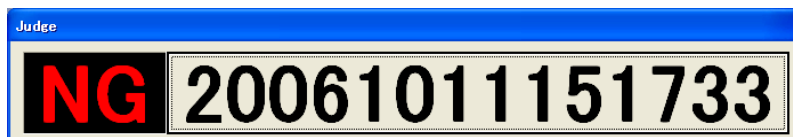


Fig.4-11-26

- When the lens does not reach the infinity end near position seconds.

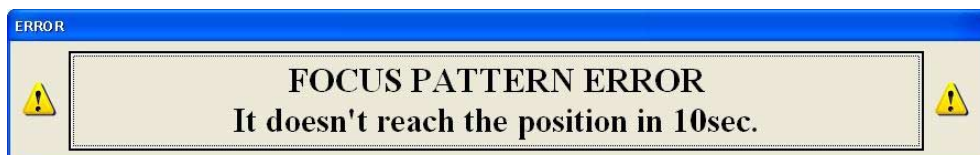


Fig.4-11-27

- 2) Perform "2. Checking Method" again, repeat the inspection until "OK" appears on the pop-up window.

5. In case of error display in the Focus Pattern (infinity position (second try))

- 1) When the error display and the NG display appear to the pop-up window, perform the work with caution so that setting the lens to the infinity position can be done in more than 5 seconds and no more than 10 seconds.
 - When the focus pattern error



Fig.4-11-28

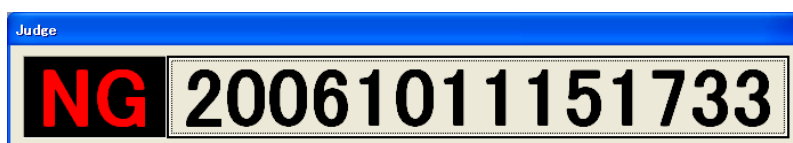


Fig.4-11-29

- When the lens does not reach the infinity end infinity position seconds.

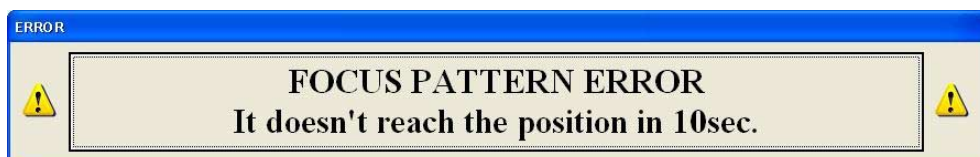


Fig.4-11-30

- 2) Perform "2. Checking Method" again, repeat the inspection until "OK" appears on the pop-up window.

4-12. WRITE dSB

Equipment

- Personal Computer
- Finished Inspection JIG (AC 100 V only)
- Lens Adjustment Program (ActuatorChecker)

1. Preparations

- 1) Connected to equipment with checking lens. (Refer to Section 4-1-3.)
- 2) Start up of “ActuatorChecker”.
- 3) Click [Set up], and perform the initial setting. (Refer to Section 4-1-4.)

2. Checking Method

- 1) Click the [Write dSB].

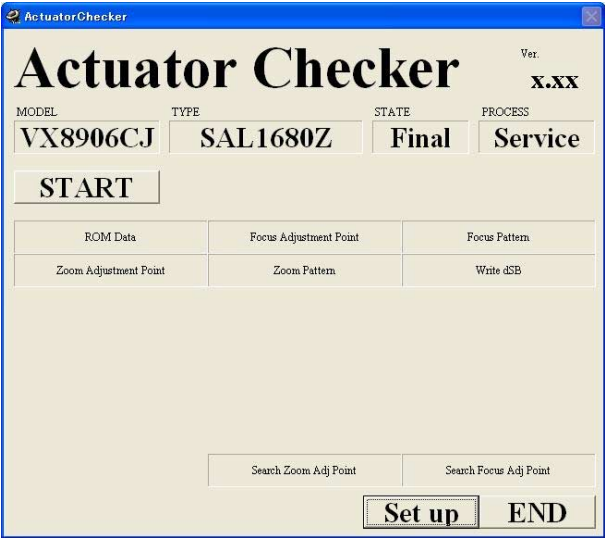


Fig.4-12-1

- 2) The Serial window appears. Input the lens serial number.

Note: When [OK] is clicked without inputting the serial number, the date executed is displayed on the completion window of each item.



Fig.4-12-2

- 3) The “Select dsb” window appears.
- 4) Being based on the image point shift amount calculated by “4-7. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE (AMOUNT OF SPHERICAL ABERRATION))”, select the button and perform the Write dSB.

Note:

- Writing dSB takes time for about 20 seconds.
- Do not remove the lens while writing it. The data of the lens becomes abnormal, and the exchange of substrates of main flexible unit is needed.

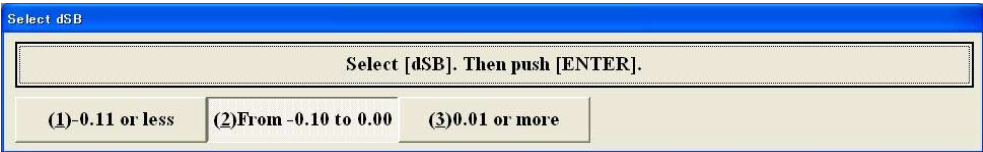


Fig.4-12-3

- 5) When the Write dSB finishes normally, “OK” appears on the pop-up window.

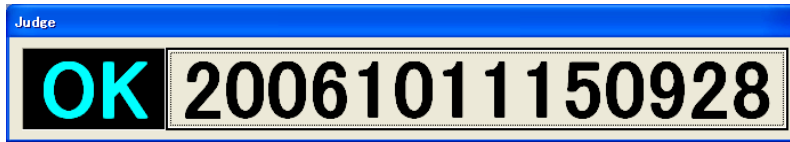


Fig.4-12-4

3. In case of error in the Write dSB

- 1) When the error display and the NG display appear to the pop-up window, press the ENTER key to return to the initial window.

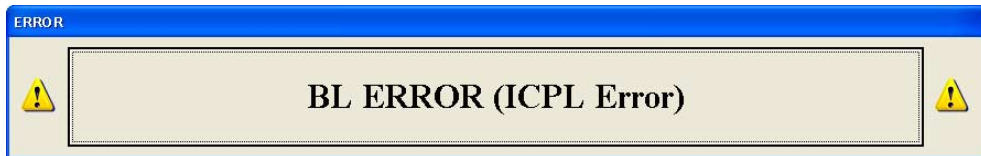


Fig.4-12-5

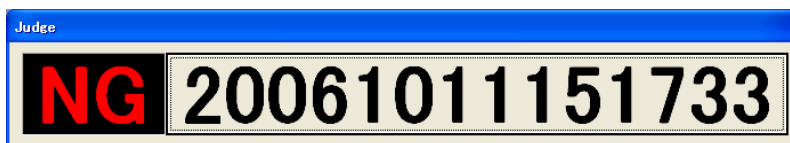


Fig.4-12-6

- 2) If the “NG” appears again, confirm or perform the following.
- Replacing the main flexible unit.
 - Connected state of equipment (Improper connection of BL error.).
- 3) Perform “2. Checking Method” again, repeat the inspection until “OK” appears on the pop-up window.

SAL1680Z

(Vario-Sonnar DT 3.5-4.5/16-80 ZA) (Vario-Sonnar T* DT 16-80mm F3.5-4.5 ZA)

SONY

SERVICE MANUAL

Ver. 1.4 2008.08

US Model
Canadian Model
AEP Model
Chinese Model

SUPPLEMENT-1

File this supplement with the service manual.

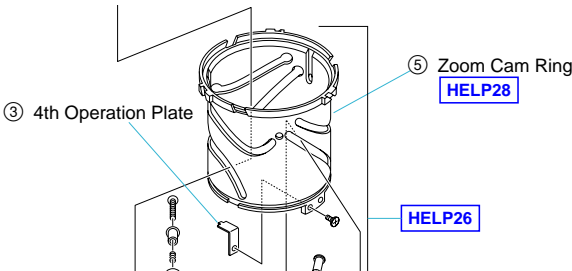
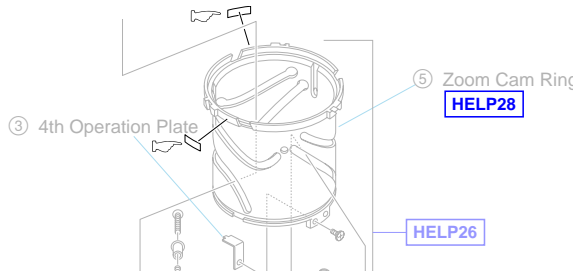
(DI08-232)

- Addition of Repair Parts
- Change of HELP21 and HELP28

2. DISASSEMBLY

2-1. DISASSEMBLY

 : Points added portion.

Page	Before change	After change
2-6	<p>2-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY</p> 	<p>2-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY</p> 





Before change

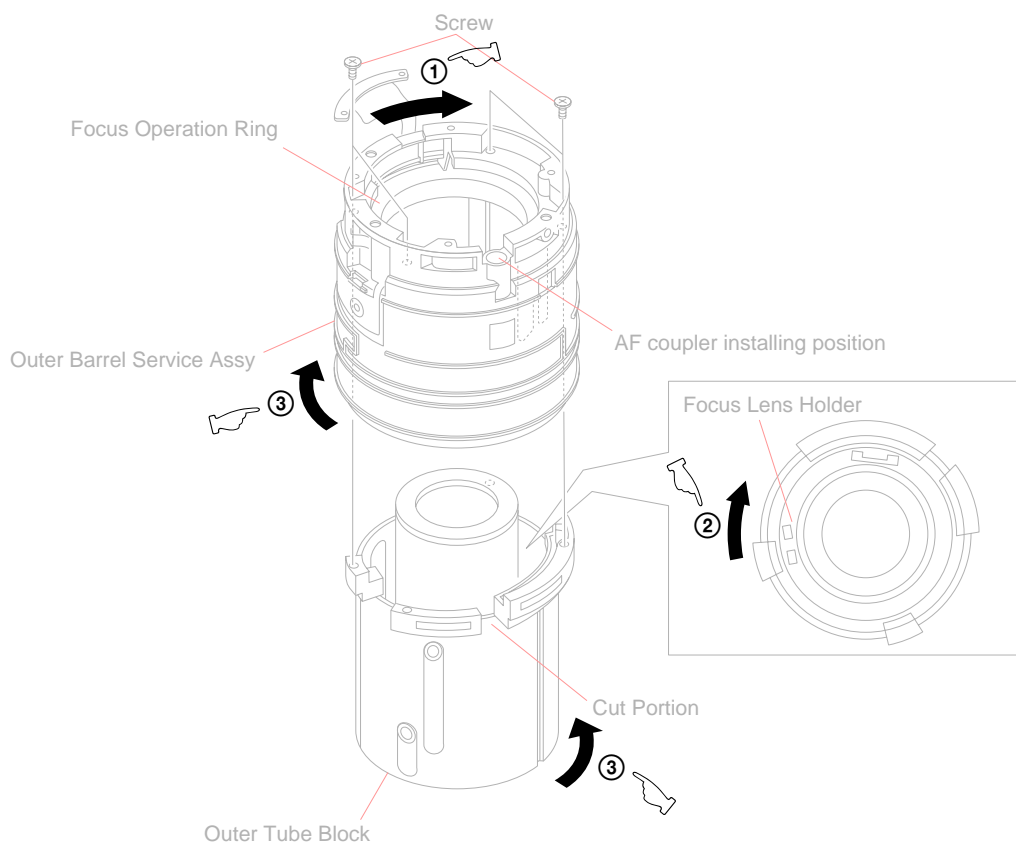
HELP21

1. Rotate fully clockwise (in the arrow direction) the focus operation ring in the outer barrel service assembly.
2. Rotate fully clockwise (in the arrow direction) the focus lens holder in the outer tube block.
3. Inserting the installation part of coupler in the cut portion of outer tube block, assemble the outer barrel assembly.
At this moment, insert the lever of focus operation ring in the lever groove of focus lens holder.
4. While pushing and rotating clockwise the outer barrel assembly, tighten diagonally four screws shown in the figure.

After change

HELP21

1. Rotate fully clockwise (in the arrow direction ①) the focus operation ring in the outer barrel service assembly.

2. Rotate fully clockwise (in the arrow direction ②) the focus lens holder in the outer tube block.

3. Inserting the installation part of coupler in the cut portion of outer tube block, assemble the outer barrel assembly.
At this moment, insert the lever of focus operation ring in the lever groove of focus lens holder.
4. While pushing and rotating clockwise (in the arrow direction ③) the outer barrel assembly and outer tube block, tighten diagonally four screws shown in the figure.
 



Before change

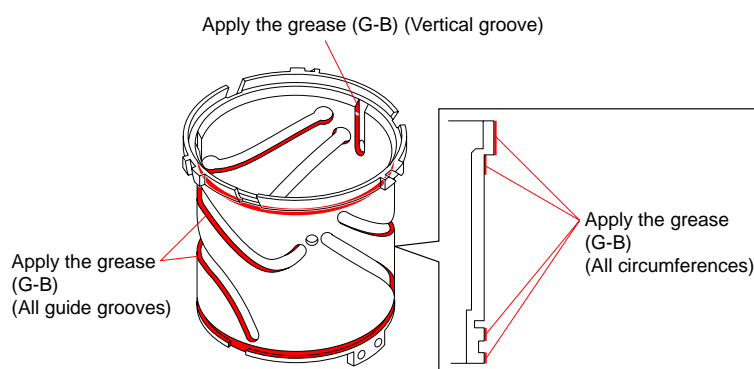
HELP28

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

Grease (G-117): J-6082-660-A

Apply the following grease (G-B) to the indicated portion of zoom cam ring.

Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)



After change

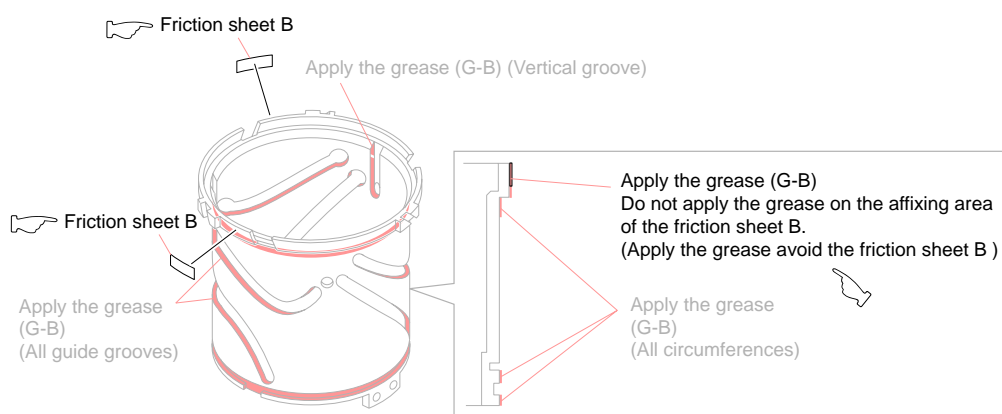
HELP28

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

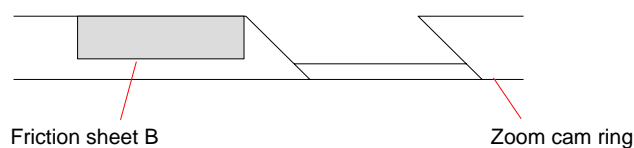
Grease (G-117): J-6082-660-A

1. Apply the following grease (G-B) to the indicated portion of zoom cam ring.

Grease (G-B) = (G-116 : G-117 = 1 : 2)(Mix grease at the following rates before using the grease, and mix grease enough.)



2. Affix the friction sheet B to the specified position of the zoom cam ring. (two locations)


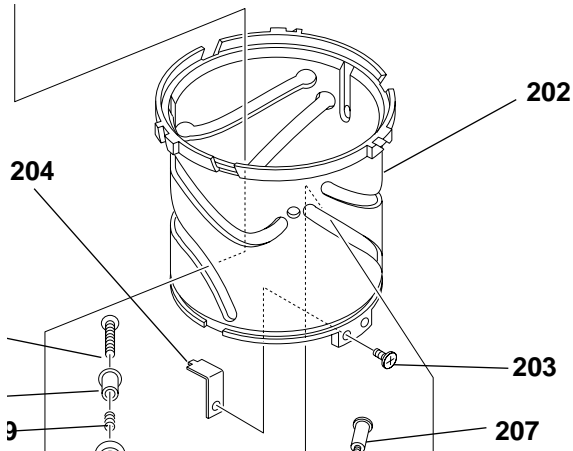
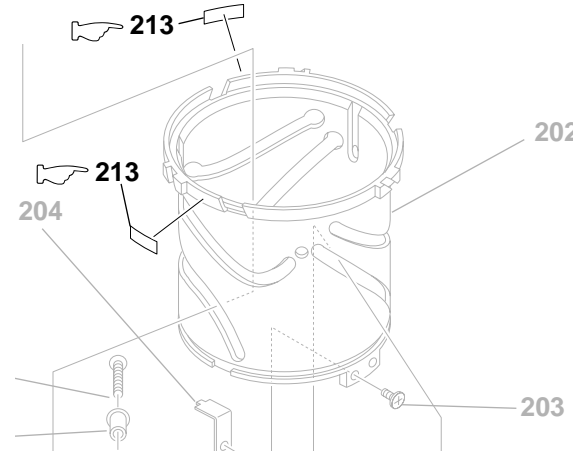



3. REPAIR PARTS LIST

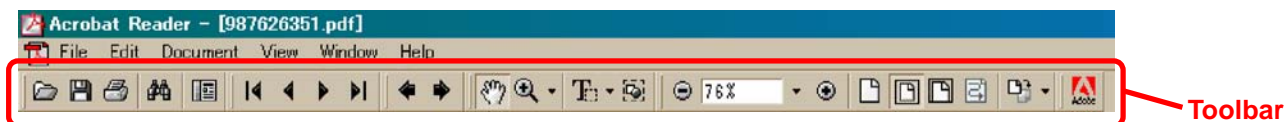
3-1. EXPLODED VIEWS

 : Points added portion.


 : Points changed portion.

Page	Before change	After change												
3-4	<p>3-1-4. MAIN FLEXIBLE UNIT, FOCUS RING AND MF OPERATION RING</p> <table> <tr> <th>Ref. No.</th><th>Part No.</th><th>Description</th></tr> <tr> <td>168</td><td>3-197-072-01</td><td>OUTER BARREL</td></tr> </table>	Ref. No.	Part No.	Description	168	3-197-072-01	OUTER BARREL	<p>3-1-4. MAIN FLEXIBLE UNIT, FOCUS RING AND MF OPERATION RING</p> <table> <tr> <th>Ref. No.</th><th>Part No.</th><th>Description</th></tr> <tr> <td>168</td><td>3-197-072-02</td><td>OUTER BARREL</td></tr> </table> 	Ref. No.	Part No.	Description	168	3-197-072-02	OUTER BARREL
Ref. No.	Part No.	Description												
168	3-197-072-01	OUTER BARREL												
Ref. No.	Part No.	Description												
168	3-197-072-02	OUTER BARREL												
3-5	<p>3-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY</p>  <table> <tr> <th>Ref. No.</th><th>Part No.</th><th>Description</th></tr> <tr> <td> </td><td> </td><td> </td></tr> </table>	Ref. No.	Part No.	Description				<p>3-1-5. REAR BARREL ASSY, ZOOM CAM RING AND FOCUS COUPLING BARREL ASSY</p>  <table> <tr> <th>Ref. No.</th><th>Part No.</th><th>Description</th></tr> <tr> <td>213</td><td>3-197-200-01</td><td>FRICTION SHEET B</td></tr> </table> 	Ref. No.	Part No.	Description	213	3-197-200-01	FRICTION SHEET B
Ref. No.	Part No.	Description												
Ref. No.	Part No.	Description												
213	3-197-200-01	FRICTION SHEET B												


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





Printing a text

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

Application of printing:

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


Reversing the screens displayed once

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

Application to the Service Manual:

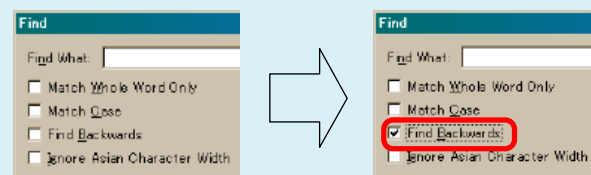
This function allows you to go and back between circuit diagram and printed circuit board diagram, and accordingly it will be convenient for the voltage check.

Finding a text

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

Application to the Service Manual:

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








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

Application to the Service Manual:


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


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

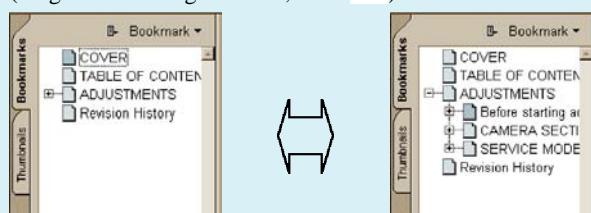
Moving with link

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

Moving with bookmark:



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

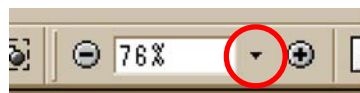
(To go back to original state, click )




Zooming or rotating the screen display

"Zoom in/out"

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







"Rotate"

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

Application to the Service Manual:

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

Switching a page

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

Revision History

Ver.	Date	History	Contents	S.M. Rev. issued
1.0	2007.03	Official Release	—	—
1.1	2007.05	Correction-1 (C1)	<ul style="list-style-type: none"> • Correction of Repair Parts and Exploded Views S.M Correction: Page 3-1, 3-2, 3-3, 3-4 	Yes
1.2	2007.08	Revised-1	<ul style="list-style-type: none"> • Change of Repair Parts (Page 3-2, 3-6, 4-24, 4-29) 	Yes
1.3	2008.05	Revised-2	<ul style="list-style-type: none"> • Addition of guide of [About the MTF measurement] (Cover, Page 3, 1-2, 1-3, 1-4, 1-5) • Change of Repair Parts (Page 3-2) • Revision of Accessories (Page 3-7) 	Yes
1.4	2008.08	Supplement-1 (DI08-232)	<ul style="list-style-type: none"> • Addition of Repair Parts • Change of HELP21 and HELP28 	No
1.5	2008.09	Revised-3	<ul style="list-style-type: none"> • Addition of Repair Parts (Page 2-5, 3-4) • Change of HELP (HELP23) 	Yes