SAL135F18Z

(Sonnar 1.8/135 ZA) (Sonnar T* 135mm F1.8 ZA)

SERVICE MANUAL

Ver. 1.4 2007.12
Revision History

How to use Acrobat Reader

Revised-1

Replace the previously issued SERVICE MANUAL 9-852-110-11 with this Manual.

US Model
Canadian Model
AEP Model
Chinese Model

Link

- SPECIFICATIONS
- DISASSEMBLY
- ADJUSTMENTS
- SERVICE NOTE
- REPAIR PARTS LIST

- About the Special Driver
- About the Lens Test Projector and Finished Inspection JIG
- About the Screw Filter Frame Assy.
- About the MTF measurement.

LENS FOR DSLR CAMERA

SONY

2007L0800-1

Published by Kohda TEC

SPECIFICATIONS

- This lens is equipped with a distance encoder. The distance encoder allows more accurate measurement (ADI) by using a flash for ADI.
- Depending on the lens mechanism, the focal length may change with any change of the shooting distance. The focal length assumes the lens is focused at infinity.

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

202.5

*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

8-11

Angle of view 1 *2

18°

Angle of view 2 *2

12°

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

Minimum focus (m (feet)) *3

0.72 (2.4)

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

Maximum magnification (×)

0.25

Minimum f-stop

f/22

Filter diameter (mm)

77

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

Approx. 88 × 114.5 (3 1/2 × 4 5/8)

Mass (g (oz.))

Approx. 995 (35 1/8)

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.

TABLE OF CONTENTS

1. SERVICE NOTE

1-1. Chemicals

Some chemicals used for servicing are highly volatile.
Their evaporation caused by improper management affects your health and environment, and wastes resources.
Manage the chemicals carefully as follows.

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

1-2. Exterior Parts

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

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

1-3. Unleaded Solder

This unit uses unleaded solder.
Boards requiring use of unleaded solder are printed with the lead free mark (LF) indicating the solder contains no lead.
(**Caution:** Some printed circuit boards may not come printed with the lead free mark due to their particular size.)

: LEAD FREE MARK
Be careful to the following points to solder or unsolder.

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

- Be sure to control soldering iron tips used for unleaded solder and those for leaded solder so they are managed separately. Mixing unleaded solder and leaded solder will cause detachment phenomenon.

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

1-4. SAFETY CHECK-OUT

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

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

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

SAFETY-RELATED COMPONENT WARNING!!

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

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

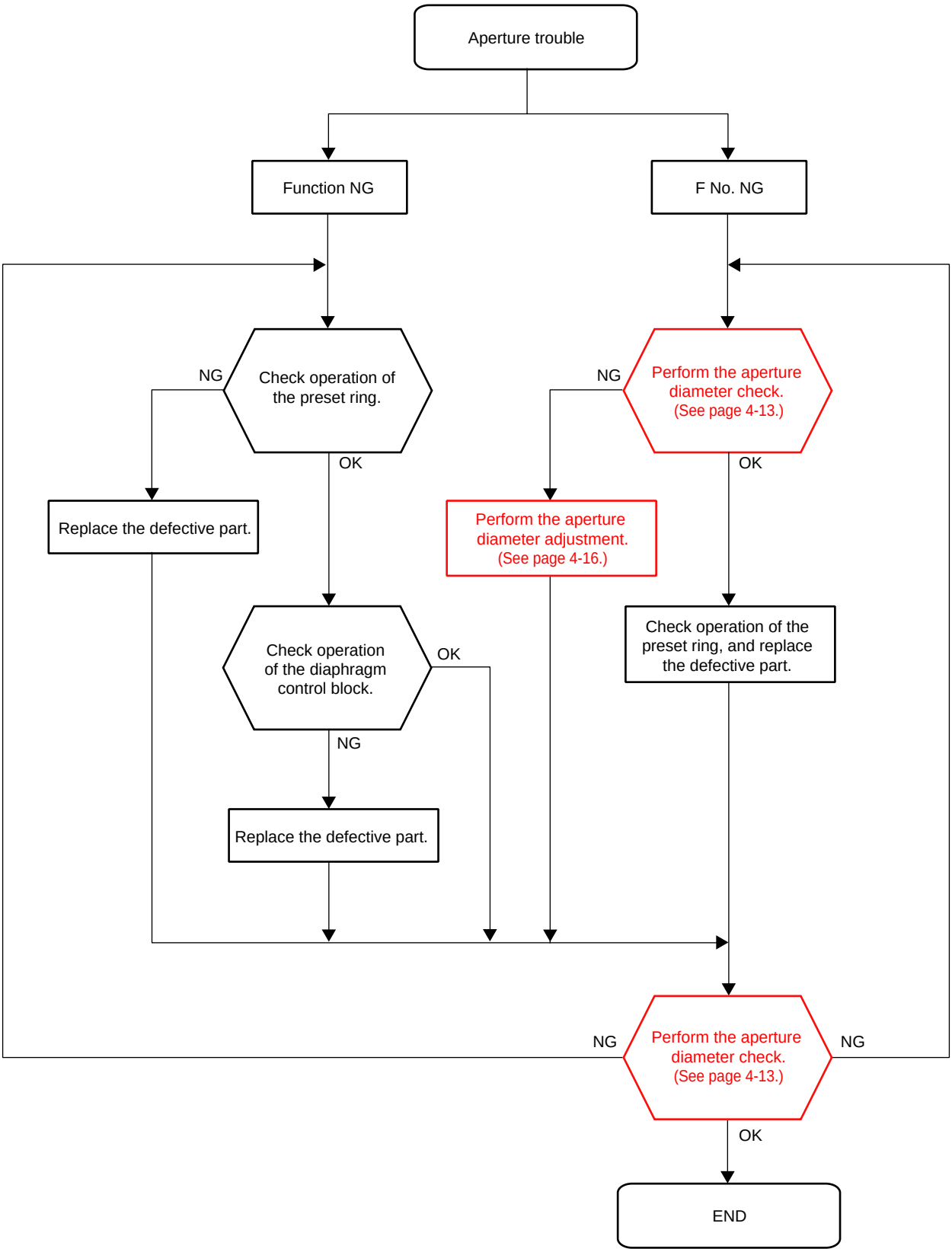
LES COMPOSANTS IDENTIFÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈSES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPÉMENTS PUBLIÉS PAR SONY.

1-5. MTF Measurement

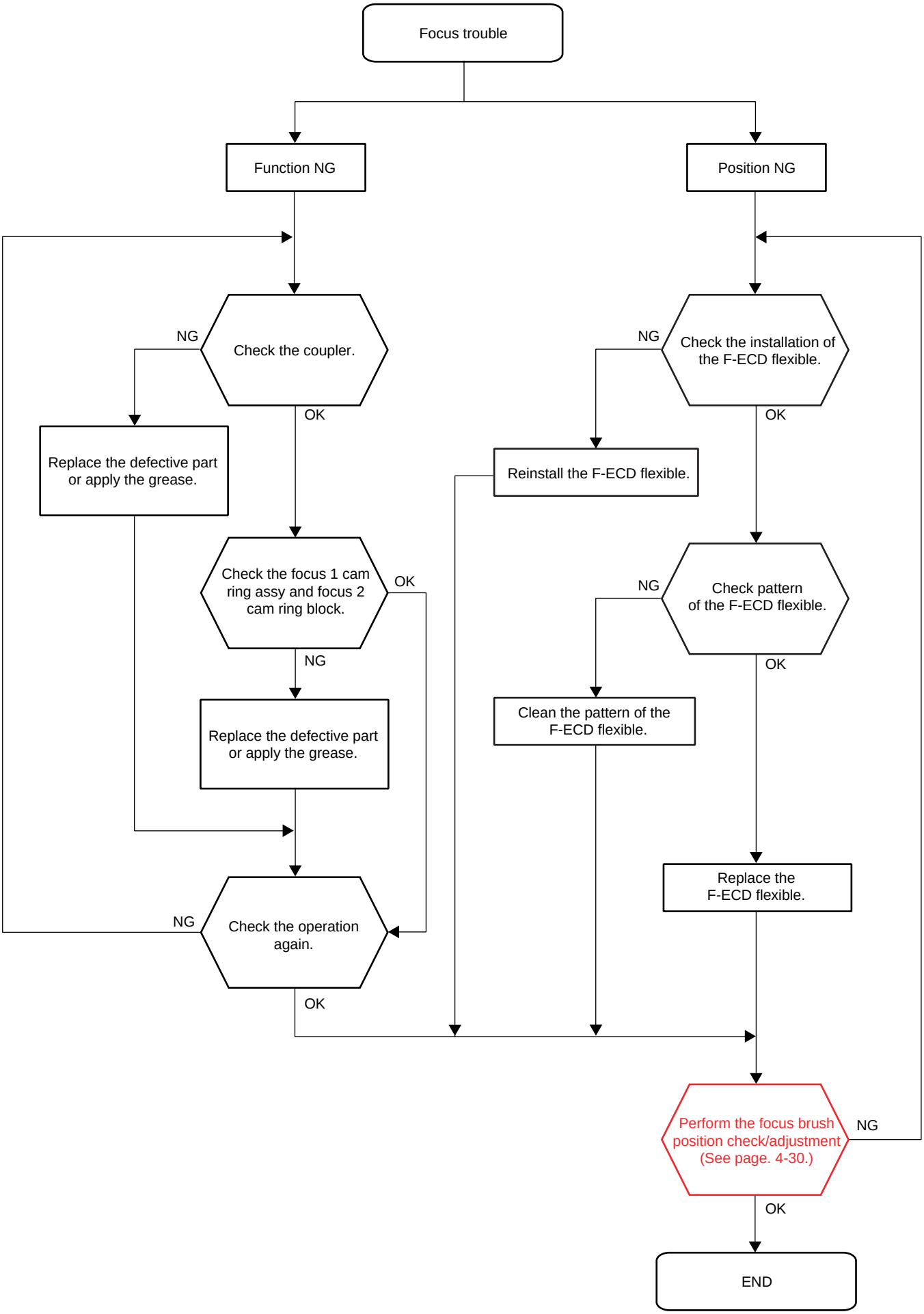
In case of replacement or disassembling the effective parts against performance, be sure to perform MTF measurement.
Please consult a related headquarters about service information.

1-5. TROUBLESHOOTING

1-5-1. Aperture Trouble



1-5-2. Focus Trouble

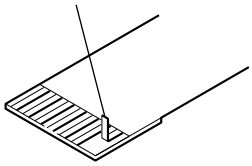


2. DISASSEMBLY

NOTE FOR REPAIR

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

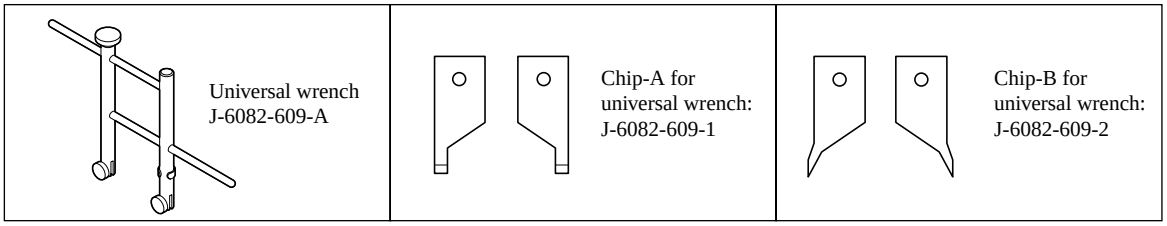
Cut and remove the part of gilt which comes off at the point. (Be careful or some pieces of gilt may be left inside)



UNIVERSAL WRENCH

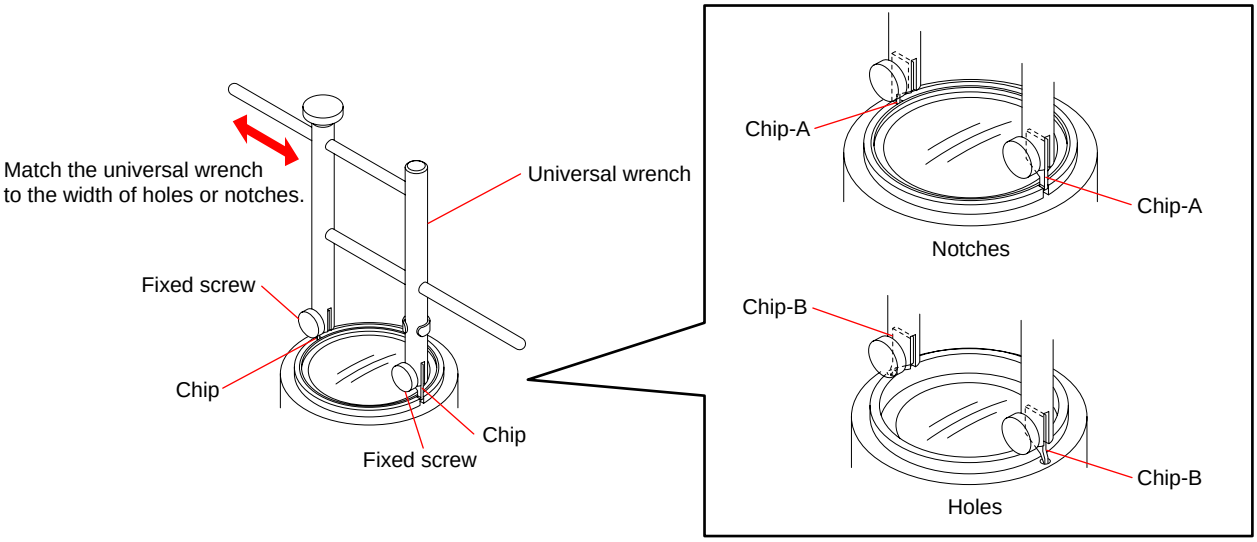
In case of the following notches or holes are located in the lens block, etc during disassembling/ assembling the lens, Use the universal wrench.

How to Use



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

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

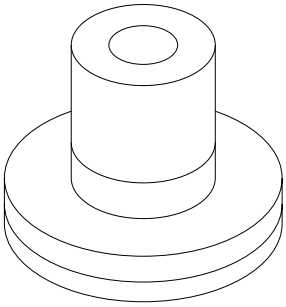


When top of tip does not reach holes or notches because the fixed screw becomes obstructive, replace the fixed screw to below.
+B 3X5 7-682-546-09

2-1. DISASSEMBLY

Note 1:

Remove the filter screw frame using the filter screw frame removing tool.
Filter screw frame removing tool: J-6082-649-A

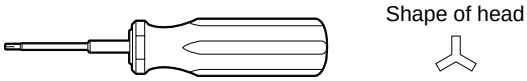


Note 2:

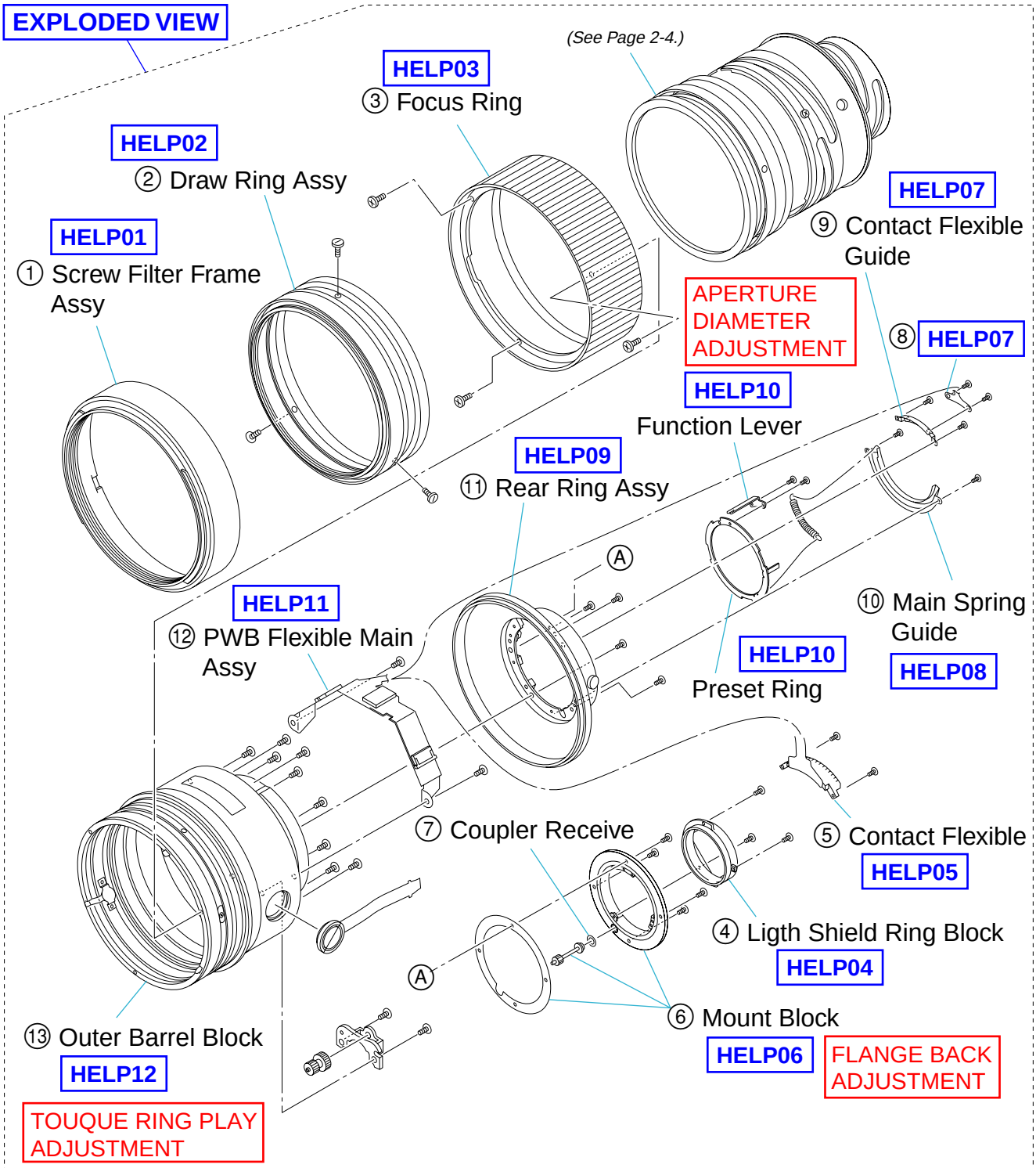
When removing or installing the parts of side of lens mount, install the filter screw frame to lens.
If removing or installing the parts of side of lens mount after the filter screw frame is removed, be careful to avoid damaging the 1 lens block.

Note 3:

Remove the screw (Ref. No. 15 or 61, 2-897-949-01 screw (3ULR-F M1.7x1.6(C3C))) using the special driver.
Special driver: J-6082-654-A

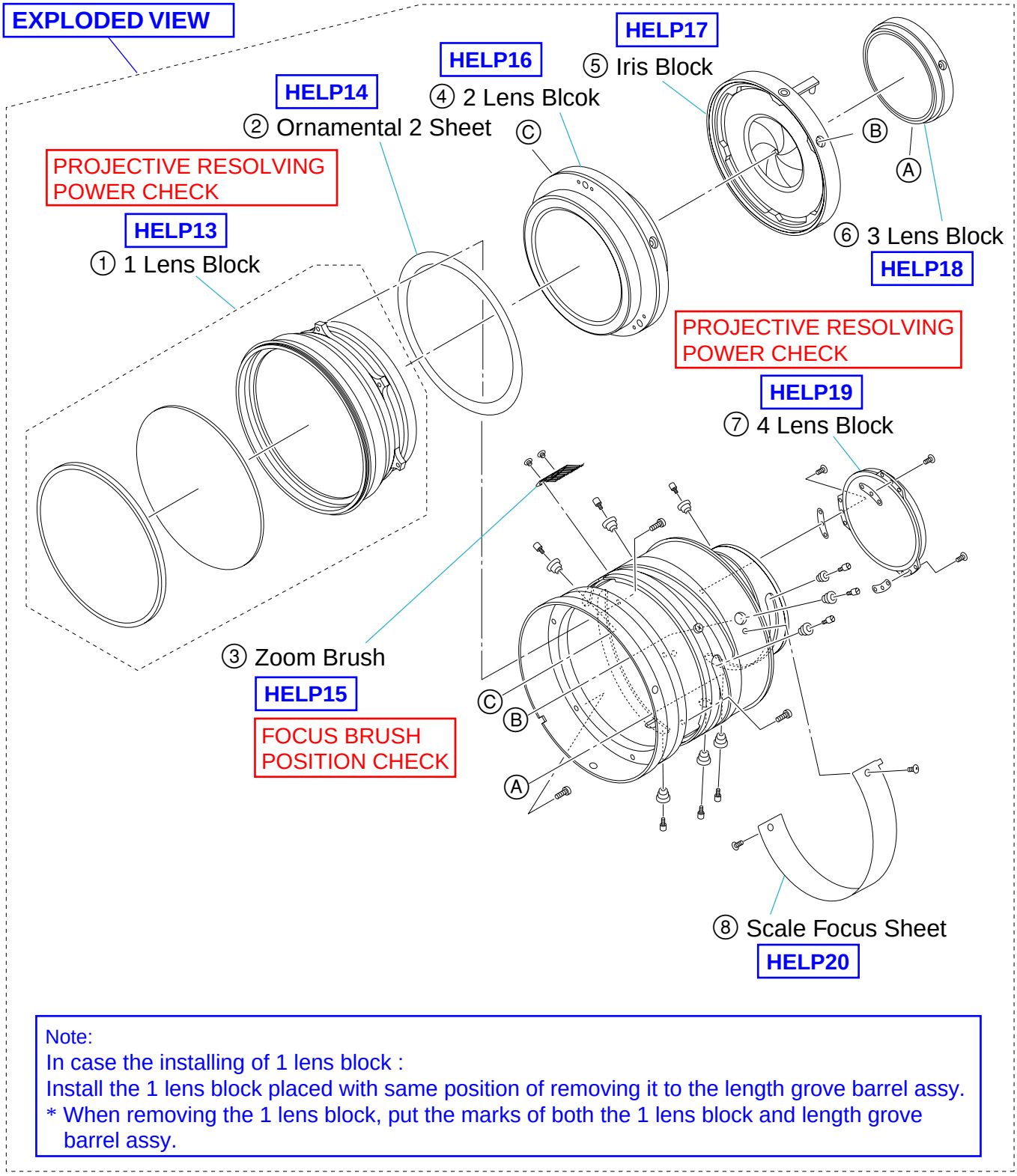


2-1-1. OUTER BARREL BLOCK, MOUNT BLOCK AND LIGHT SHIELD RING BLOCK



Note:
- In case the removing of screw filter frame assy :
  Before removing the screw filter frame assy, lubricate a small solvent (alcohol) to a gap between screw filter frame assy and draw ring assy, hereby dissolve the adhesive bond. Then remove it.
- About the screw filter frame assy :
  Be sure avoiding replacement of screw filter frame assy 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.

2-1-2. 1, 2, 3 AND 4 LENS BLOCK



Note:
In case the installing of 1 lens block :
Install the 1 lens block placed with same position of removing it to the length grove barrel assy.
* When removing the 1 lens block, put the marks of both the 1 lens block and length grove barrel assy.

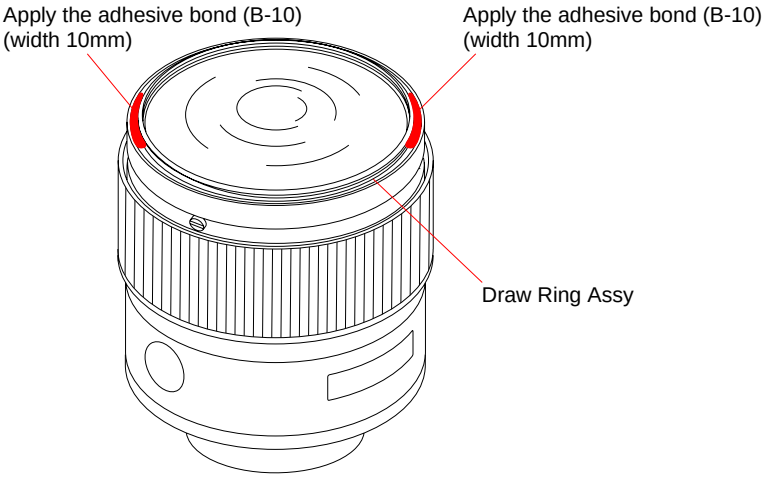
HELP

Note for assembling and grease applying positions are shown.

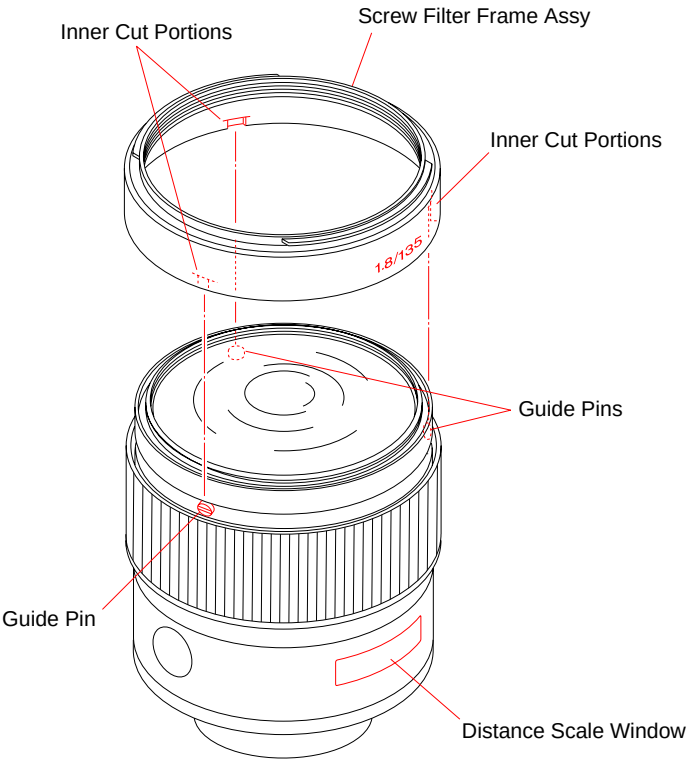
HELP01

Adhesive bond (B-10): J-6082-612-A
Filter screw frame removing tool: J-6082-649-A

1. Apply the adhesive bond (B-10) in 10mm width to the location shown in figure of draw ring assy.



2. Aligning the inner cut portions at three locations with the guide pins, install the screw filter frame assy with the print of [1.8/135] placed at the distance scale window side.



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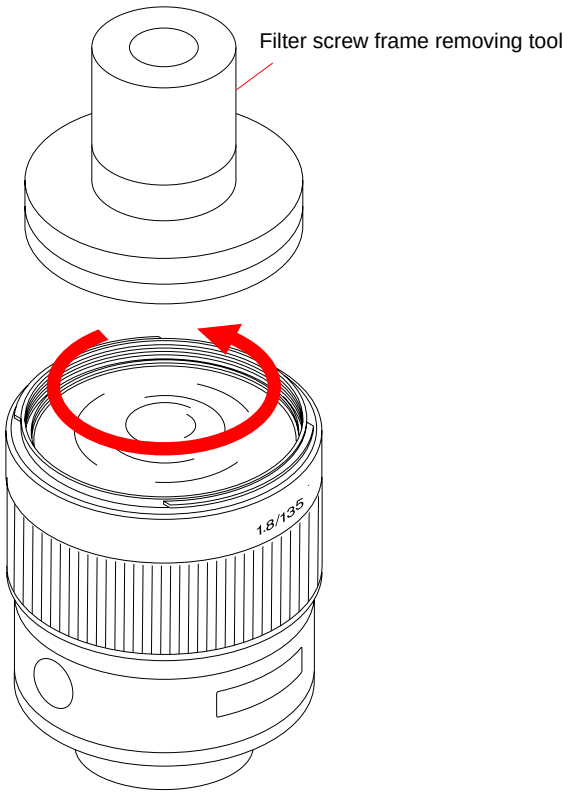
Ver. 1.3 are shown in blue.

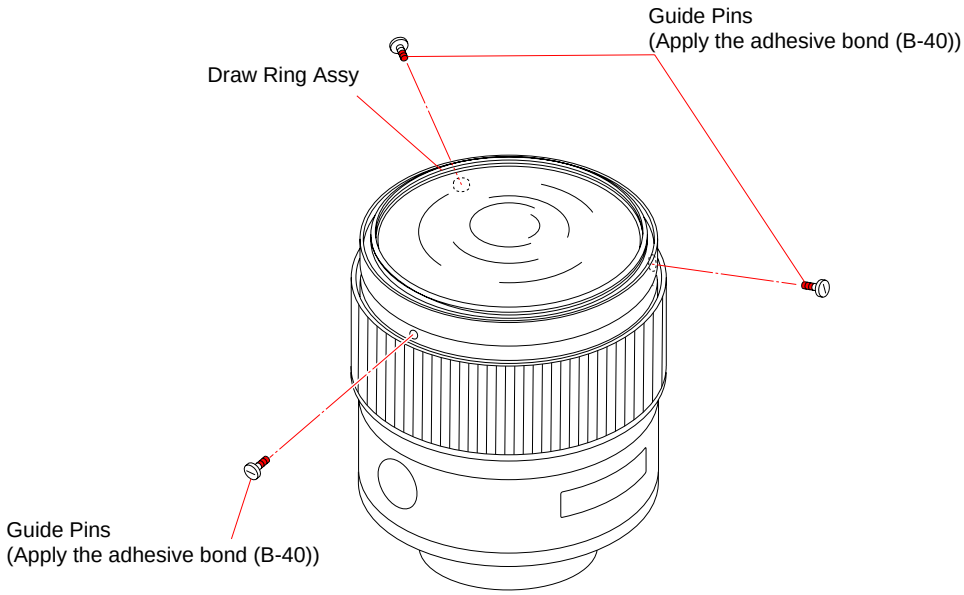
3. Push the filter screw frame removing tool to the draw ring assy and rotate it counterclockwise as far as it goes and stops.



HELP02

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

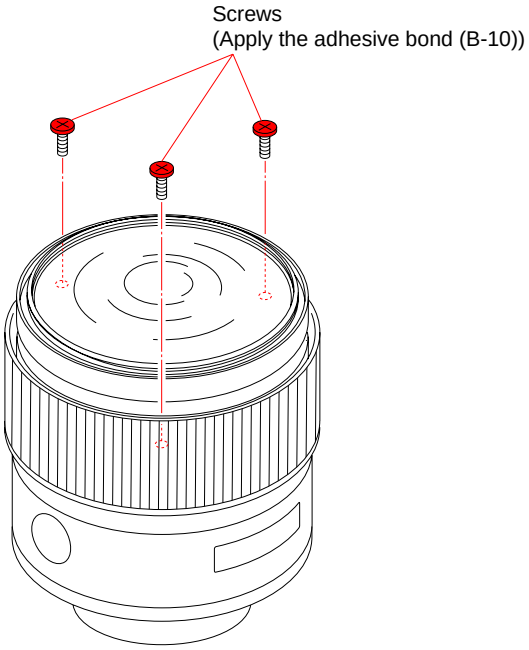
1. Install the draw ring assy.
2. Apply the adhesive bond (B-40) to the tip of three guide pins and tighten them.



HELP03

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

1. Install the focus ring and tighten three screws to fix it.
2. Apply the adhesive bond (B-10) to the heads of screws.

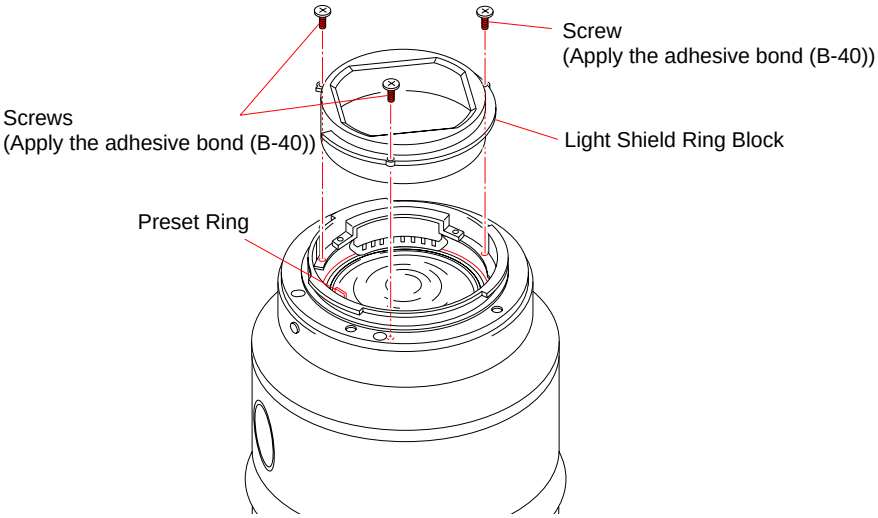


HELP04

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

1. Install the rear light shiled ring block, apply the adhesive bond (B-40) to the screws, and tighten three screws.
   Note: Be careful not to drop screws in the lens.

2. Confirm that the preset ring moves smoothly.

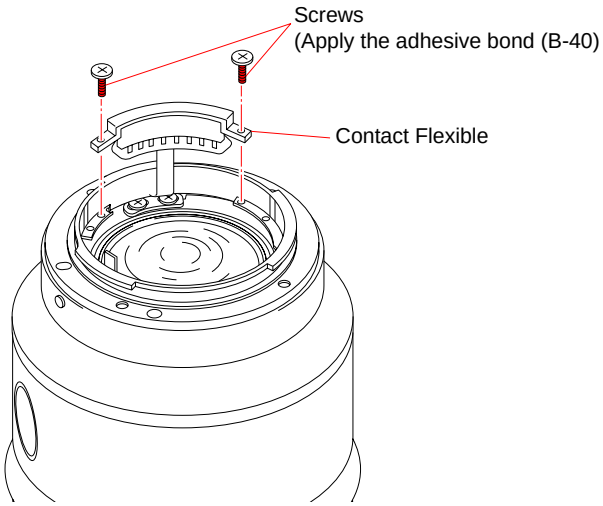


HELP05

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

Install the contact flexible. Apply the adhesive bond (B-40) to the screwed portions of screws, and tighten two screws to fix the contact flexible.

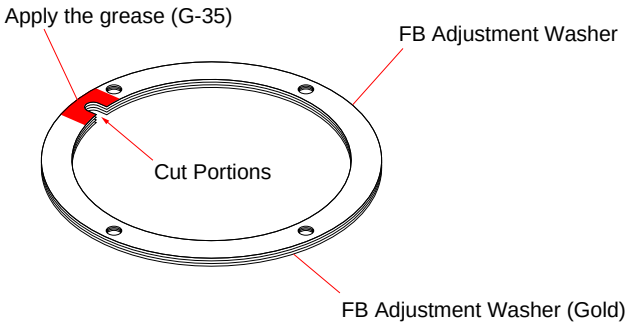
Note: Be careful not to drop screws in the lens.



HELP06

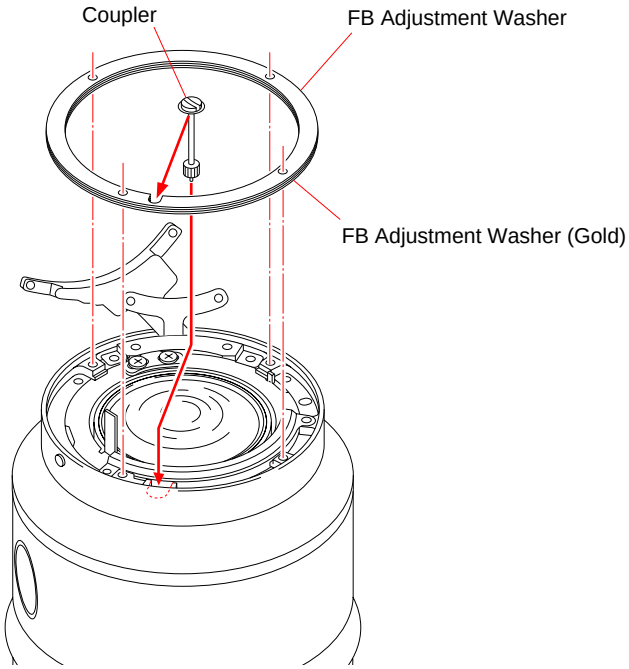
Grease (G-35): J-6082-621-A
Adhesive bond (B-40): J-6082-614-A

1. After completing the flange back adjustment, place the golden FB adjustment washer on the side of mount, and overlay the FB adjustment washers selected in the adjustment, aligning their cut portions. Then, apply the grease (G-35) to the cut portion of washer on the top.



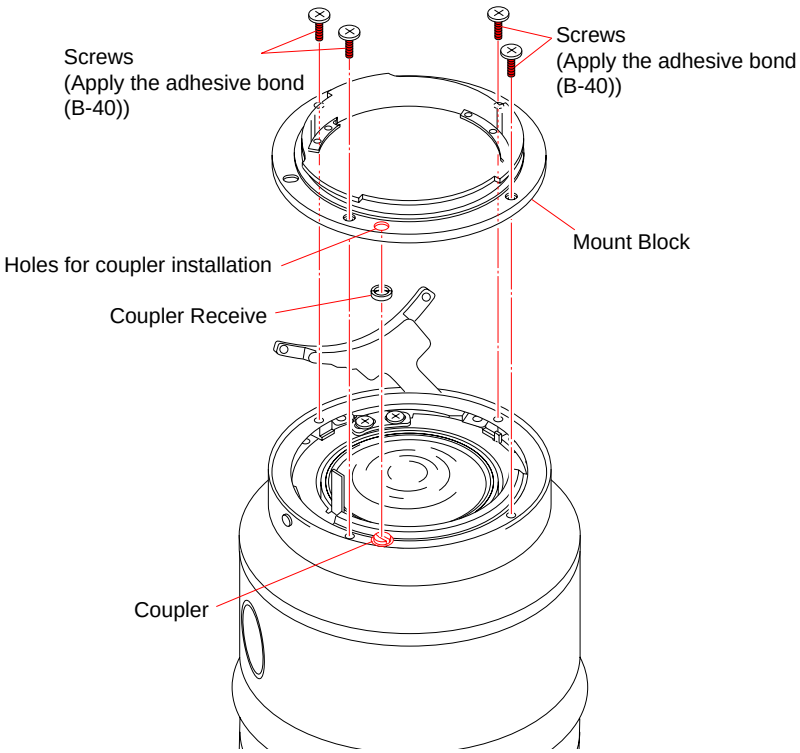
2. After inserting the shaft of coupler in the cut portion of FB adjustment washer, install it to the lens.

Note: • Place the golden FB adjustment washer on the side of mount.
• Be careful not drop the coupler.



3. Align four holes of FB adjustment washers with holes for screws.
4. While inserting the head of coupler in the holes for coupler installation, install the mount block to the lens. Apply the adhesive bond (B-40) to the screwed portions of screws. Then, tighten four screws to fix the mount block.

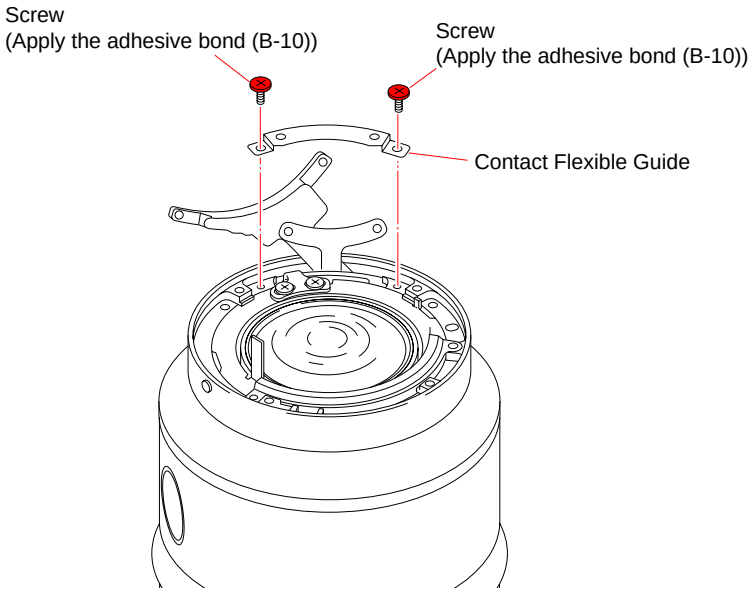
Note:
- Before installing the mount block, confirm that the white coupler receive is inserted in the hole for coupler installation.
- After tightening the screws, confirm that the coupler rotates when the focus ring is rotated.



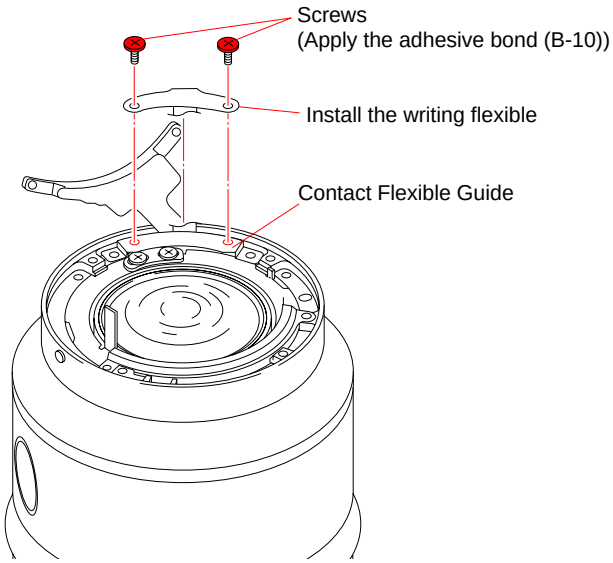
HELP07

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

1. Install the contact flexible guide and tighten two screws to fix it.
2. Apply the adhesive bond (B-10) to the heads of screws.



3. Install the writing flexible of contact block to the contact board guide with two screws.
4. Apply the adhesive bond (B-10) to the heads of screws.

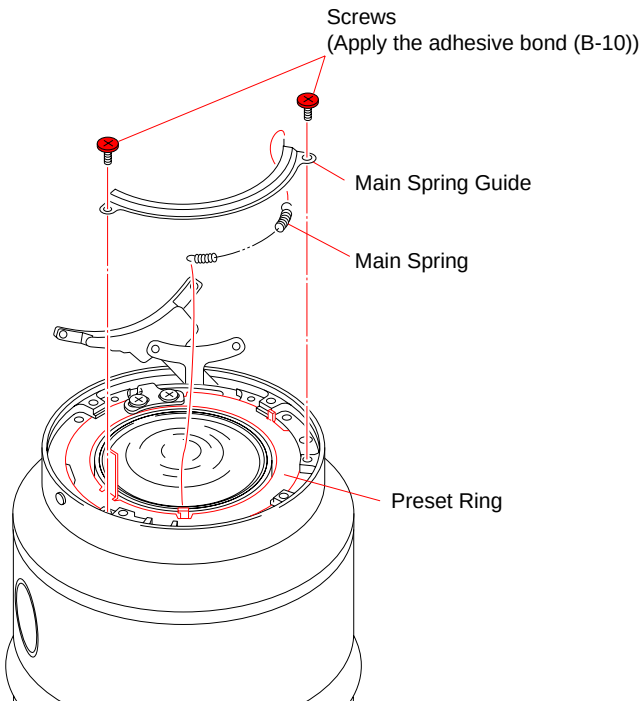


HELP08

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

1. Hook the one end of main spring to the lever of preset ring and the other end to lever of main spring guide.
2. Fix the main spring guide with two screws.
   Note: When installing the main spring guide, place the main spring in the inner side of cut and elected portion.

3. Apply the adhesive bond (B-10) to the heads of screws.
4. Confirm that the preset ring moves smoothly.

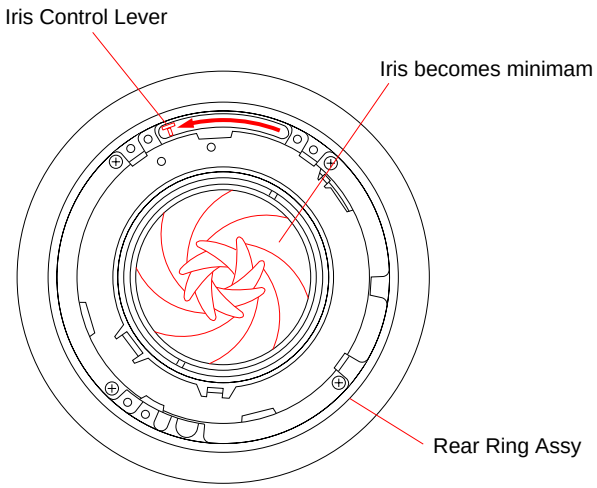


HELP09

In case that the function lever does not remove to the rear ring assy (No need of aperture diameter adjustment)

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

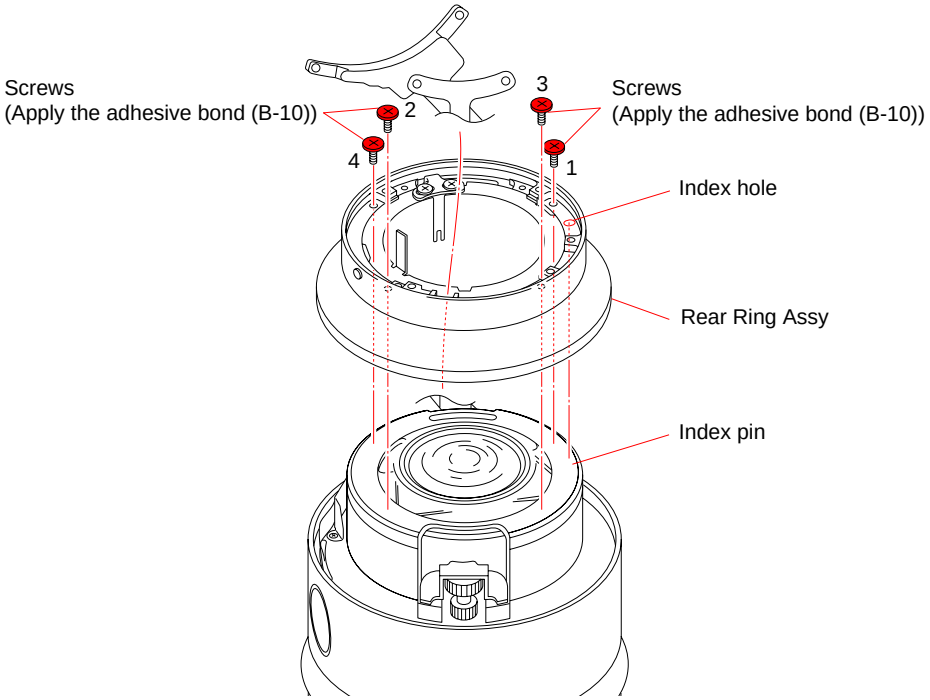
1. Rotate counterclockwise the iris control lever of iris block inside the lens with tweezers so that the opening of iris becomes minimam.



2. Through the contact flexible between the rear ring assy and preset ring.
3. Combine the groove at the tip of function lever to the pin of iris block.
4. Install so that align the index pin of focus hold barrel block to the index hole of the rear ring assy.
   Note: After installing, confirm that the index pin is securely inserted in the index hole.

5. Fix the rear ring assy with four screws, tightening screws in orders shown in figure.
   Note: After installing the function lever, confirm that the iris opens and closes when the lever of preset ring is turned.

6. Apply the adhesive bond (B-10) to the heads of four screws.
   Note: Apply the adhesive bond to the outer diameter side of head of screws and be careful for the bond not to flow in the groove for preset ring.

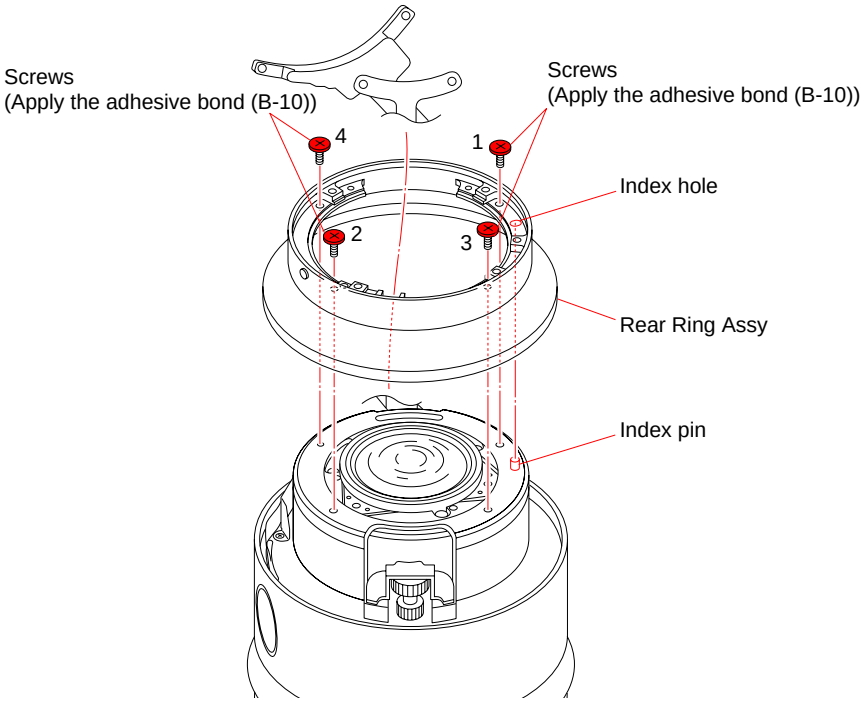


In case that the function lever removes to the rear ring assy (Requires of aperture diameter adjustment)

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

1. Install so that align the index pin of focus hold barrel block to the index hole of the rear ring assy.
   Note: After installing, confirm that the index pin is securely inserted in the index hole.

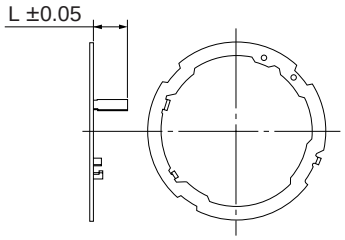
2. Fix the rear ring assy with four screws, tightening screws in orders shown in figure.
3. Apply the adhesive bond (B-10) to the heads of four screws.
   Note: Apply the adhesive bond to the outer diameter side of head of screws and be careful for the bond not to flow in the groove for preset ring.



HELP10

Adhesive bond (B-10): J-6082-612-A
Special driver: J-6082-654-A

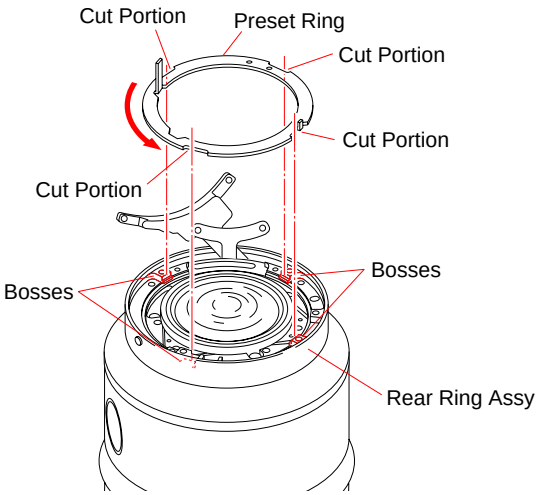
Note: Before installing the preset ring, adjust the flange back adjustment.
Depending on the "(amount of FB adjustment washers) + 0.1mm" used in the flange back adjustment, select the thickness of preset ring to be built in the lens from the table below.
Three types of preset ring are provided.



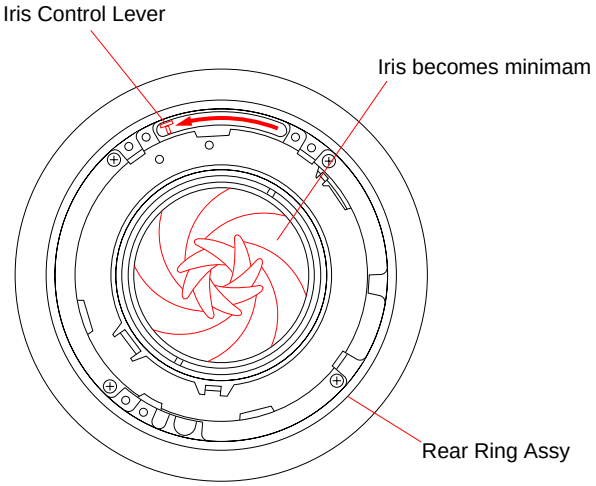
Name	Part Code	Height of lever (L)
Preset Ring A	2-898-007-01	9.24 ±0.05
Preset Ring B	2-898-007-11	9.49 ±0.05
Preset Ring C	2-898-007-21	9.74 ±0.05

(Amount of FB adjustment washer) + 0.1	Preset ring to be used
0.1	A
0.2	A
0.3	A or B
0.4	B
0.5	B
0.6	C
0.7	C
0.8	C

1. Measure the thickness of FB adjustment washers used in the flange back adjustment with micrometer or caliper. Depending on the measured thickness, select the preset ring from the table.
2. Aligning four cut portions of preset ring with the bosses of rear ring assy at four locations, install the preset ring.
   Note: After installing the preset ring, confirm that the preset ring moves smoothly.

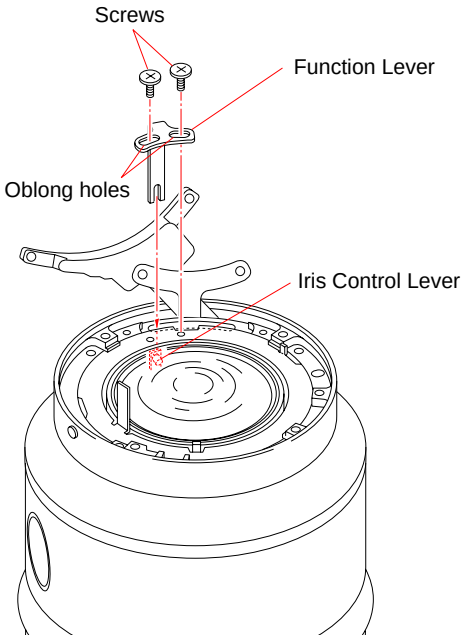


3. Rotate counterclockwise the iris control lever of iris block inside the lens with tweezers so that the opening of iris becomes minimam.



4. While inserting the groove at the tip of function lever in the iris control lever of iris block of iris inside the lens, install the function lever to the preset ring and fix it tentatively in the center of oblong hole with two screws. (Use the special driver: J-6082-654-A)
   Note: After installing the function lever, confirm that the iris opens and closes when the lever of preset ring is turned.

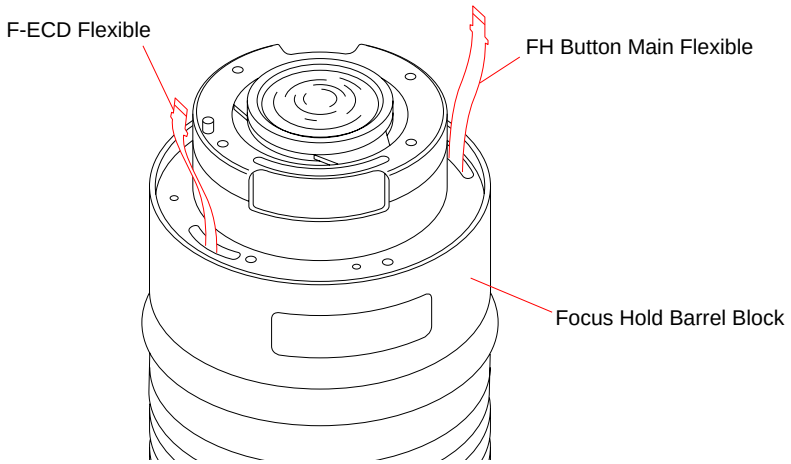
5. Adjust the aperture diameter. (Refer to 4-2.)
6. After adjust the aperture diameter, apply the adhesive bond (B-10) to the tip of screws.



HELP11

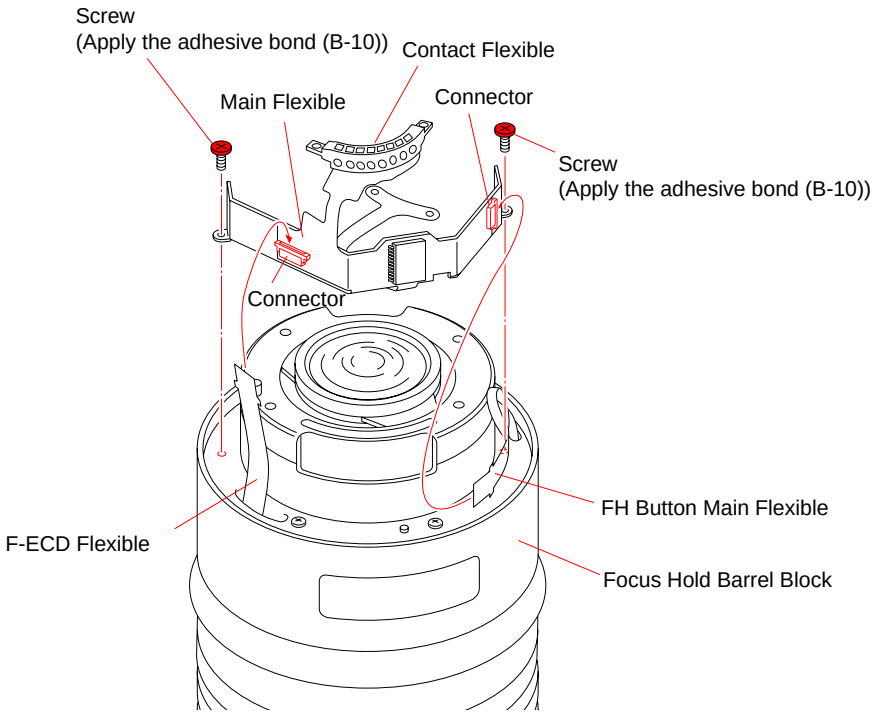
Adhesive bond (B-10): J-6082-612-A

1. Confirm that the F-ECD flexible and the FH button main flexible come out of holes of focus hold barrel block respectively. If not, re-install the focus hold barrel block. (Refer to HELP12.)



2. Install the PWB flexible main assy and tighten two screws to fix it.
3. Apply the adhesive bond (B-10) to the heads of screws.
4. Connect the F-ECD flexible and FH button main flexible to the connectors of main board.

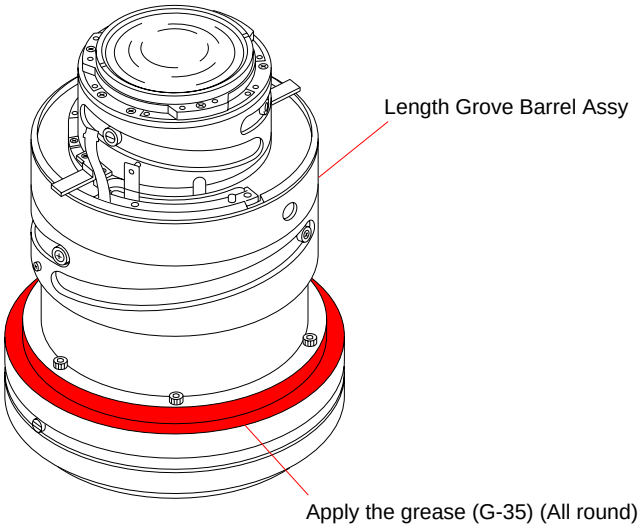
Note:
- To prevent the wire cutting from occurring, bend the flexible board perpendicularly.
- After connecting, confirm that the connector is securely locked.



HELP12

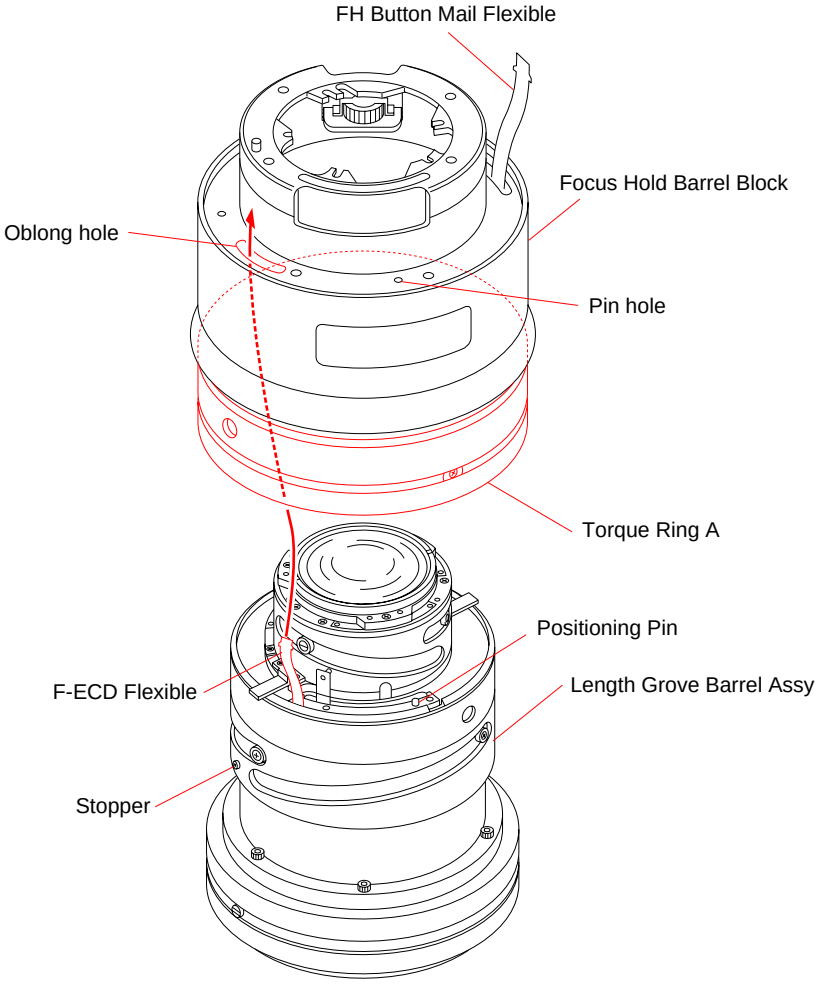
Adhesive bond (B-10): J-6082-612-A
Grease (G-35): J-6082-621-A

1. Apply the grease (G-35) to the location shown in figure of length grove barrel assy.

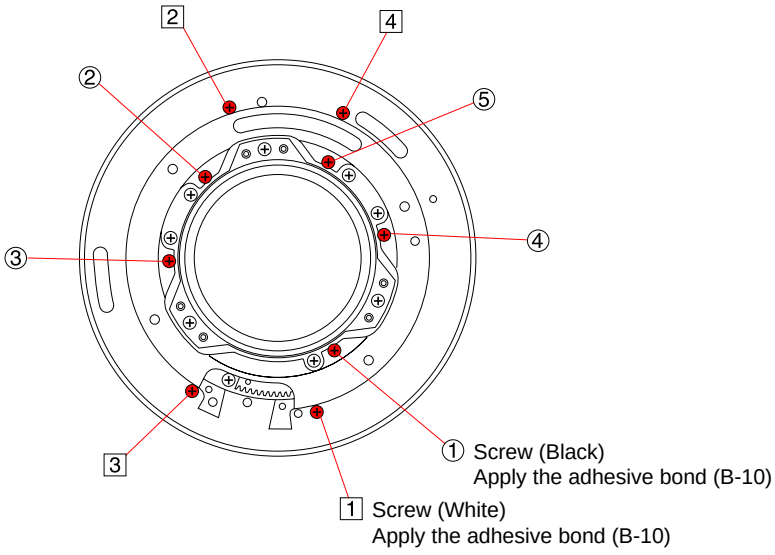


2. Put the F-ECD flexible board through the oblong hole of focus hold barrel block.
3. Align the positioning pin of length grove barrel assy to the pin hole of focus hold barrel block.
4. Install it with rotating the torque ring A of focus hold barrel block.

Note: Align the stopper of focus 1 cam ring assy with the cam joint ring of focus hold barrel block.



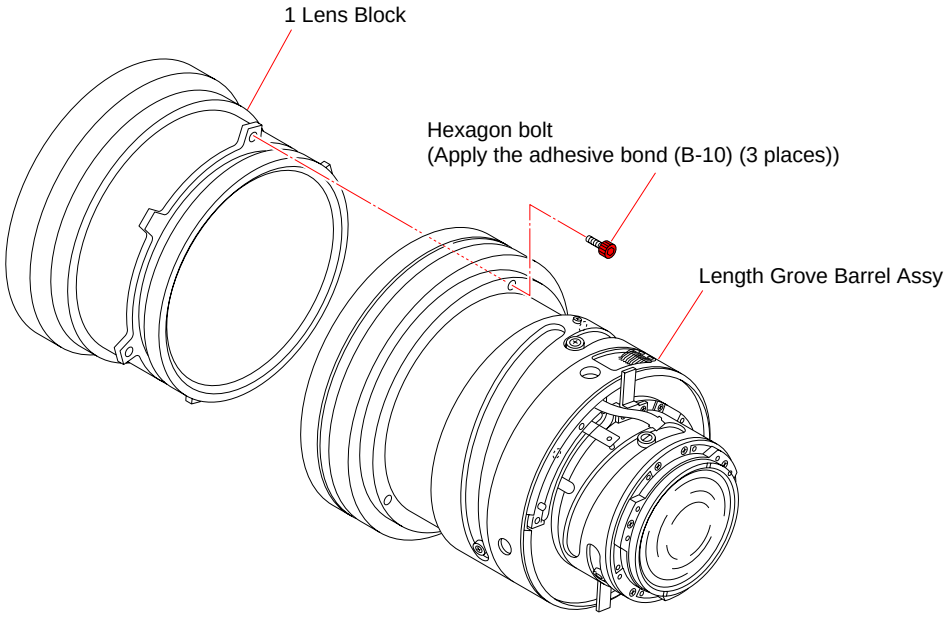
5. Tightening four screws (white) (screws 1 to 4 in figure) and five screws (black) (screws 1 to 4 in figure) in orders shown in figure, fix the outer barrel block to the length grove barrel assy.
6. Apply the adhesive bond (B-10) to the heads of nine screws.
7. Perform the torque ring play adjustment. (Refer to 4-6.)



HELP13

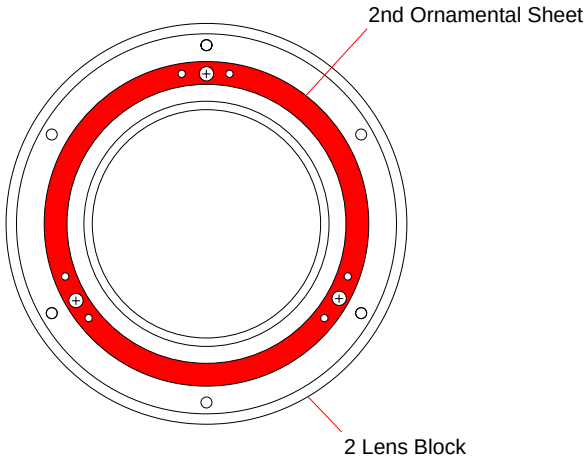
Adhesive bond (B-10): J-6082-612-A

1. Install the 1 group lens block to the length grove barrel assy and tighten three hexagon bolts to fix it.
2. Apply the adhesive bond (B-10) the head of hexagon bolt at the length grove barrel assy side.
   Note: Be careful for the adhesive bond not to seep out to the outer diameter side of length grove barrel assy.



HELP14

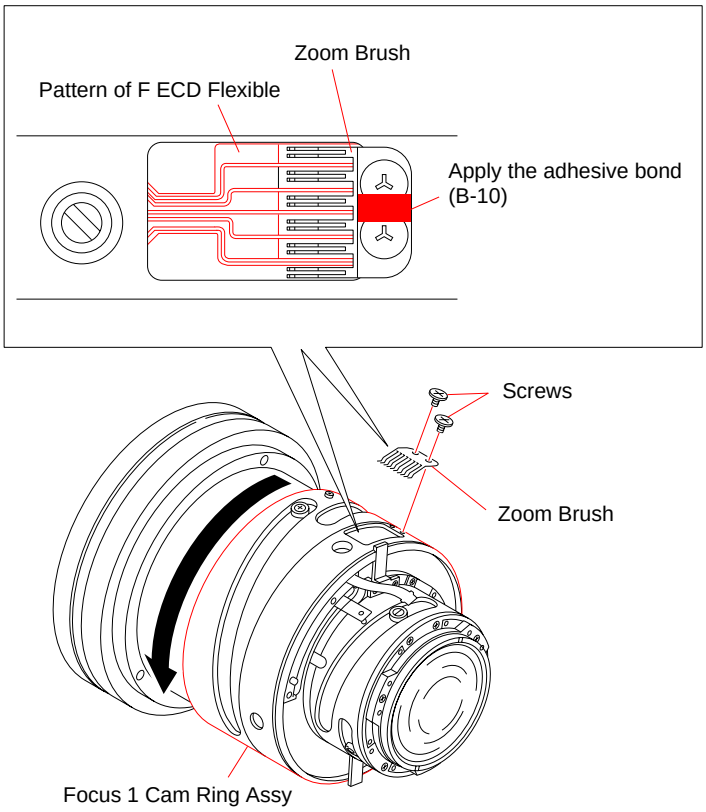
Peel off the detached paper from the 2nd ornamental sheet and affix it to the location specified in figure.



HELP15

Adhesive bond (B-10): J-6082-612-A
Special driver: J-6082-654-A

1. Rotate the focus 1 cam ring assy in the arrow direction to make the infinity end.
2. Install the zoom brush and tighten two screws to fix it. (Use the special driver: J-6082-654-A)
3. Confirm that the brush securely contacts the trace on F-ECD flexible and has no bending.
4. Perform the adjustment of focus brush position. (Refer to 4-8.)
5. After finishing the position adjustment, apply the adhesive bond (B-10) to the location of screwed portion shown in figure.

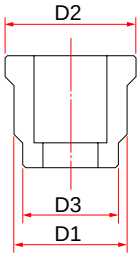


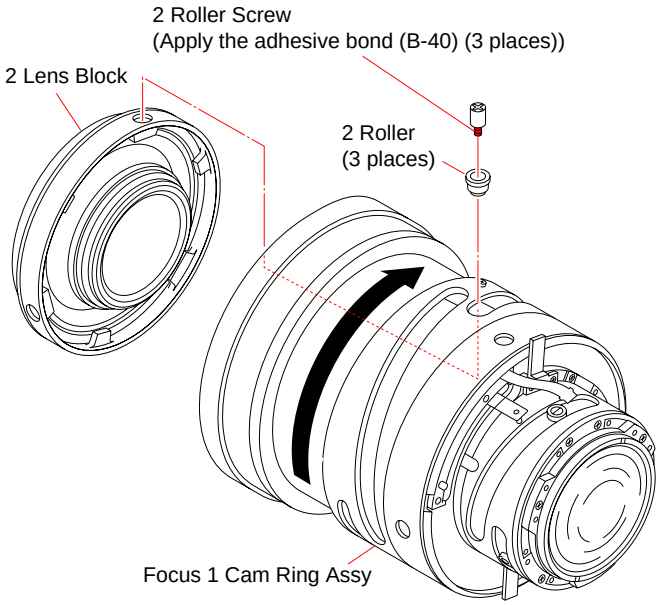
HELP16

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

1. Rotate the focus cam ring assy to allowed direction, set to the near position.
2. Install the 2 lens block to the length grove barrel assy side. Apply the adhesive bond (B-40) to the screwed portions of 2 roller screws. Then, fix the 2 group lens block with the 2 roller and the 2 roller screws at three locations.
   Note: Select the 2 roller with a play of 0 to 0.010mm with respect to the groove width of length grove barrel assy.

Part Code	Part Name	Diameter		
		D1	D2	D3
2-897-888-01	2 C roller	3.99	4.50	3.50
2-897-889-01	2 K roller	4.00	4.52	3.50
2-897-890-01	2 L roller	4.01	4.53	3.50





3. Confirm that the focus 1 cam ring assy rotates smoothly.

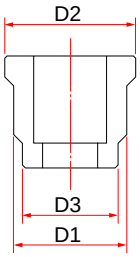
HELP17

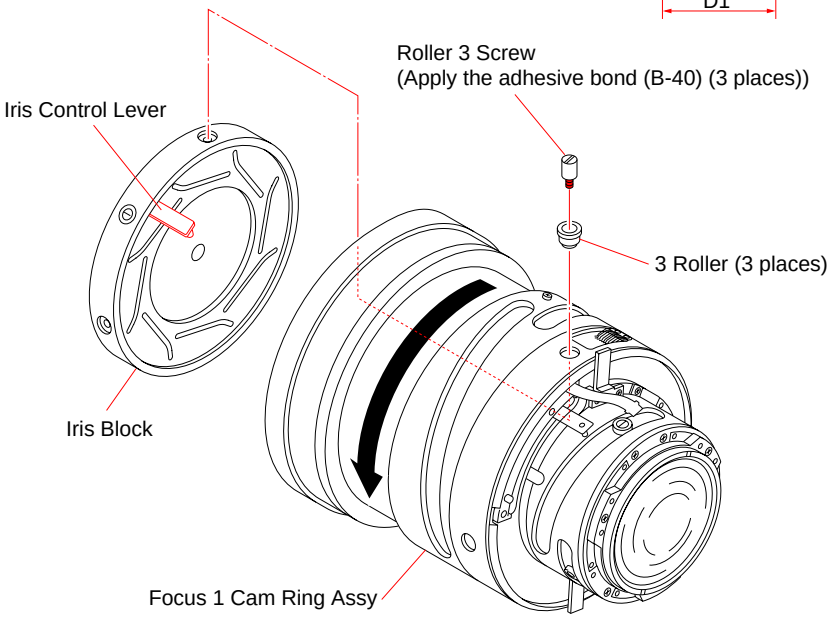
Adhesive bond (B-40): J-6082-614-A

1. Rotate the focus cam ring assy to allowed direction, align it to the roller 3 hole in the vicinity of infinity end.
2. While inserting the iris control lever in the oblong hole of length grove barrel assy, install the iris block. Apply the adhesive bond (B-40) to the screwed portions of 3-roller screws. Then, fix the iris block with the 3 roller and the 3-roller screws at three locations.

   Note: • When assembling, do not touch the iris blades.
   • Select the 3 roller with diameter (0 to 0.010mm) that is a little larger than the diameter of a hole of length grove barrel assy. And press and fit it in the hole.

Part Code	Part Name	Diameter		
		D1	D2	D3
2-897-899-01	3 A roller	3.99	4.50	3.48
2-897-900-01	3 D roller	3.99	4.51	3.48



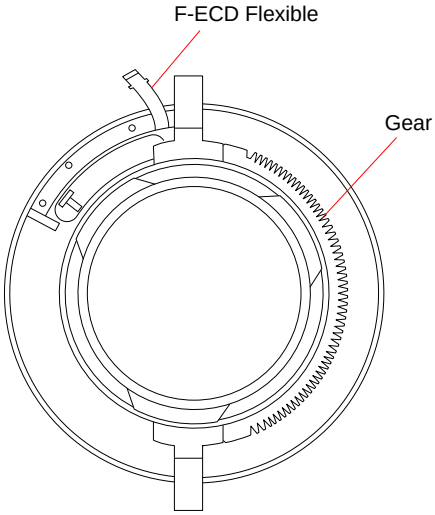


3. Confirm that the focus 1 cam ring assy rotates smoothly.

HELP18

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

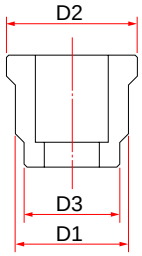
1. Rotate the focus 2 cam ring block so that the position of relationship between the F-ECD flexible and the gear is as shown in figure.

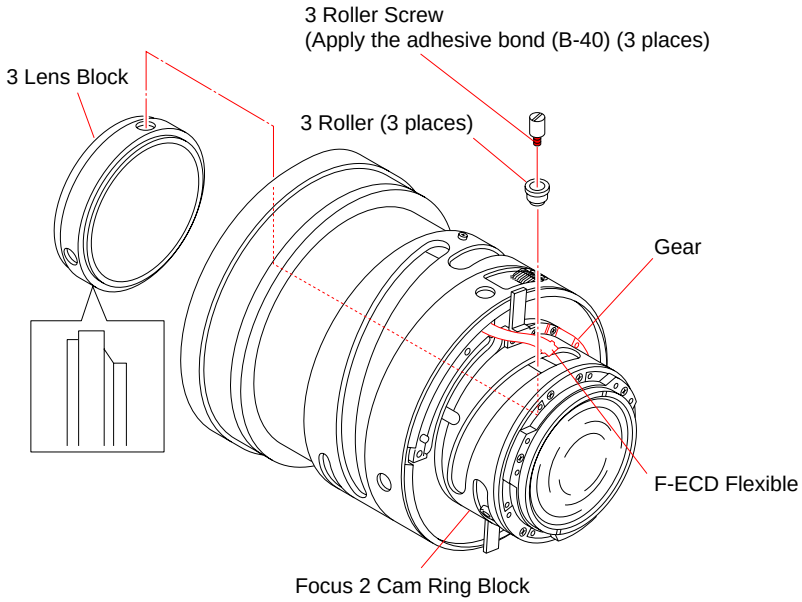


2. Install the 3 group lens block to the length grove barrel assy. Apply the adhesive bond (B-40) to the screwed portions of 3-roller screws. Then, fix the 3 group lens block with the 3 roller and the 3-roller screws at three locations.

Note:
- When assembling, do not touch the lens.
- Use the 3 roller with a play of 0 to 0.010mm with respect to the groove width of length grove barrel assy.

Part Code	Part Name	Diameter		
		D1	D2	D3
2-897-899-01	3 A roller	3.99	4.50	3.48
2-897-900-01	3 D roller	3.99	4.51	3.48



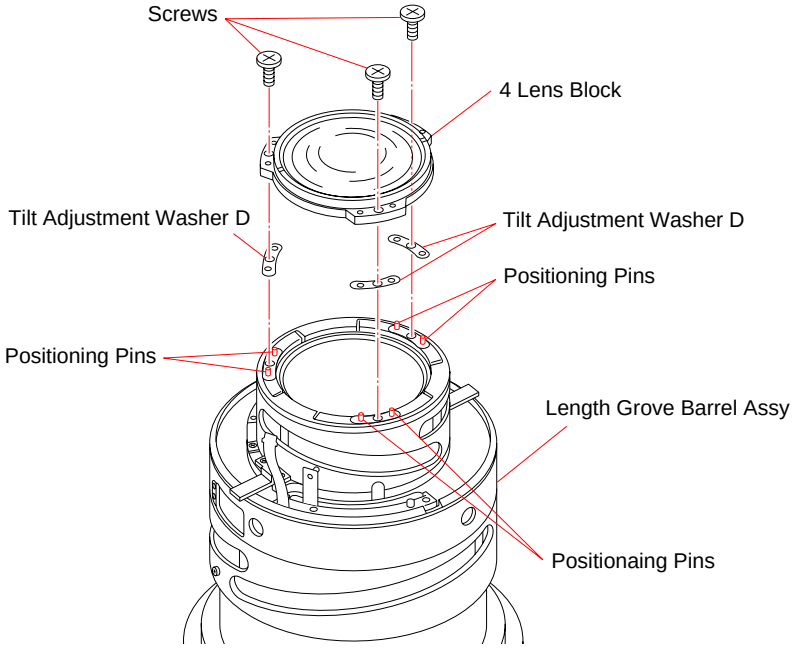


3. Confirm that the focus cam 2 ring block rotates smoothly.

HELP19

1. After removing the tilt adjustment washers, they should reinstall the replaced positions.
   Note: After replacing the lens block 4, install the three tilt adjustment washers D (0.1mm) as shown in figure.

2. Install the 4 lens block, aligning it with positioning pins at three locations of length grove barrel assy. Then, tighten three screws to fix the 4 lens block.

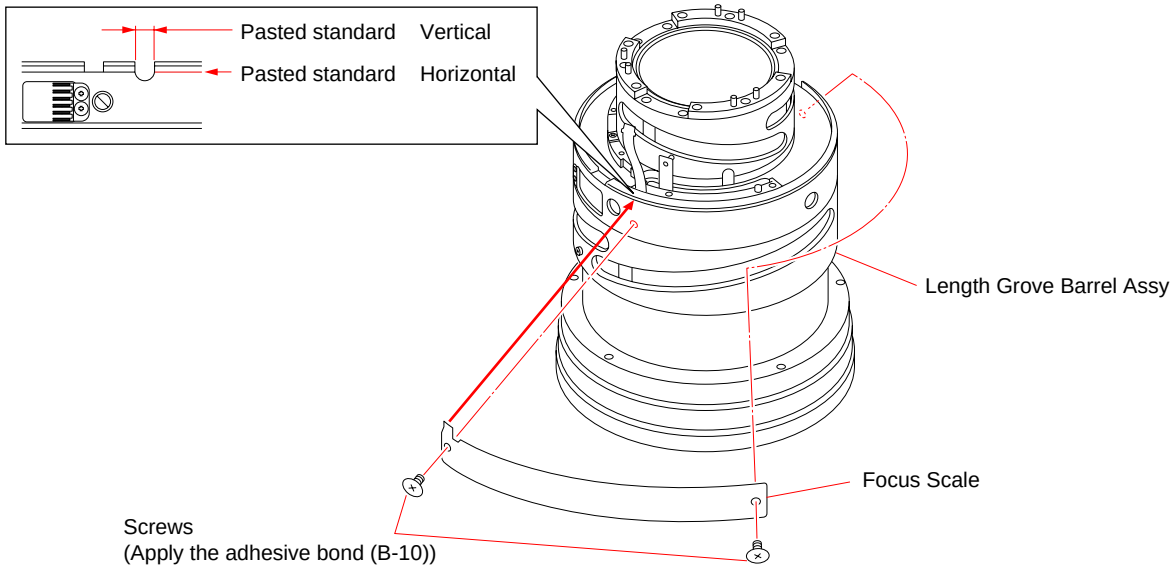


HELP20

Adhesive bond (B-10): J-6082-612-A
Special driver: J-6082-654-A

1. Affix the focus scale to meet the length grove barrel assy (vertical, horizontal).
   Note:
   - Confirm that the focus scale is not floated.
   - Confirm that the surface of focus scale is clean.

2. Expose both ends of focus scale by peeling off the protection tape so that screws can be tightened.
3. Fix the focus scale with two screws. (Use the special driver: J-6082-654-A)
4. Apply the adhesive bond (B-10) to the heads of screws.



3. REPAIR PARTS LIST

DISASSEMBLY

NOTE:

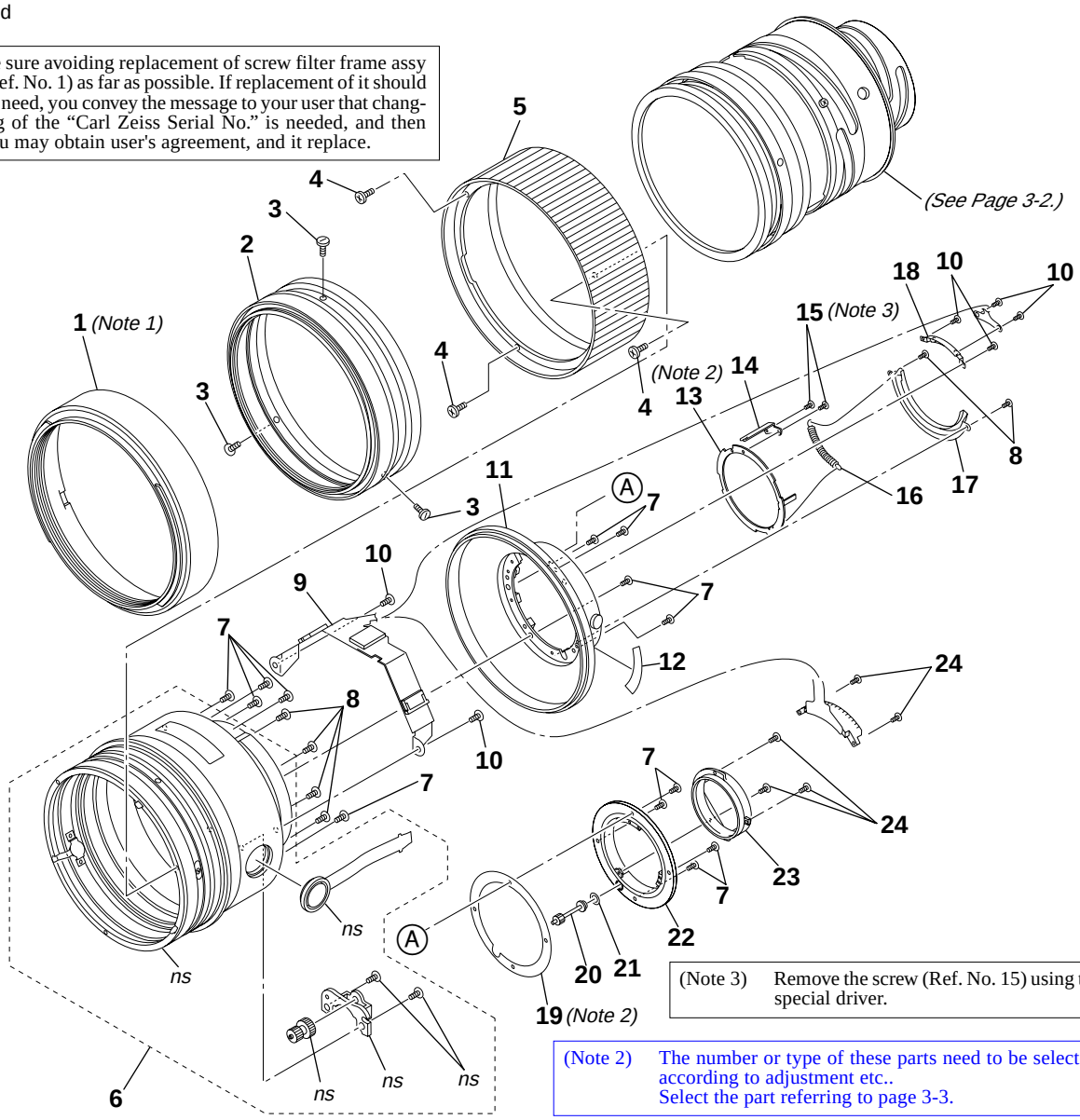
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded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

3-1. EXPLODED VIEWS

3-1-1. OUTER BARREL BLOCK, MOUNT BLOCK AND LIGHT SHIELD RING BLOCK

ns: not supplied

(Note 1) Be sure avoiding replacement of screw filter frame assy (Ref. No. 1) 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.



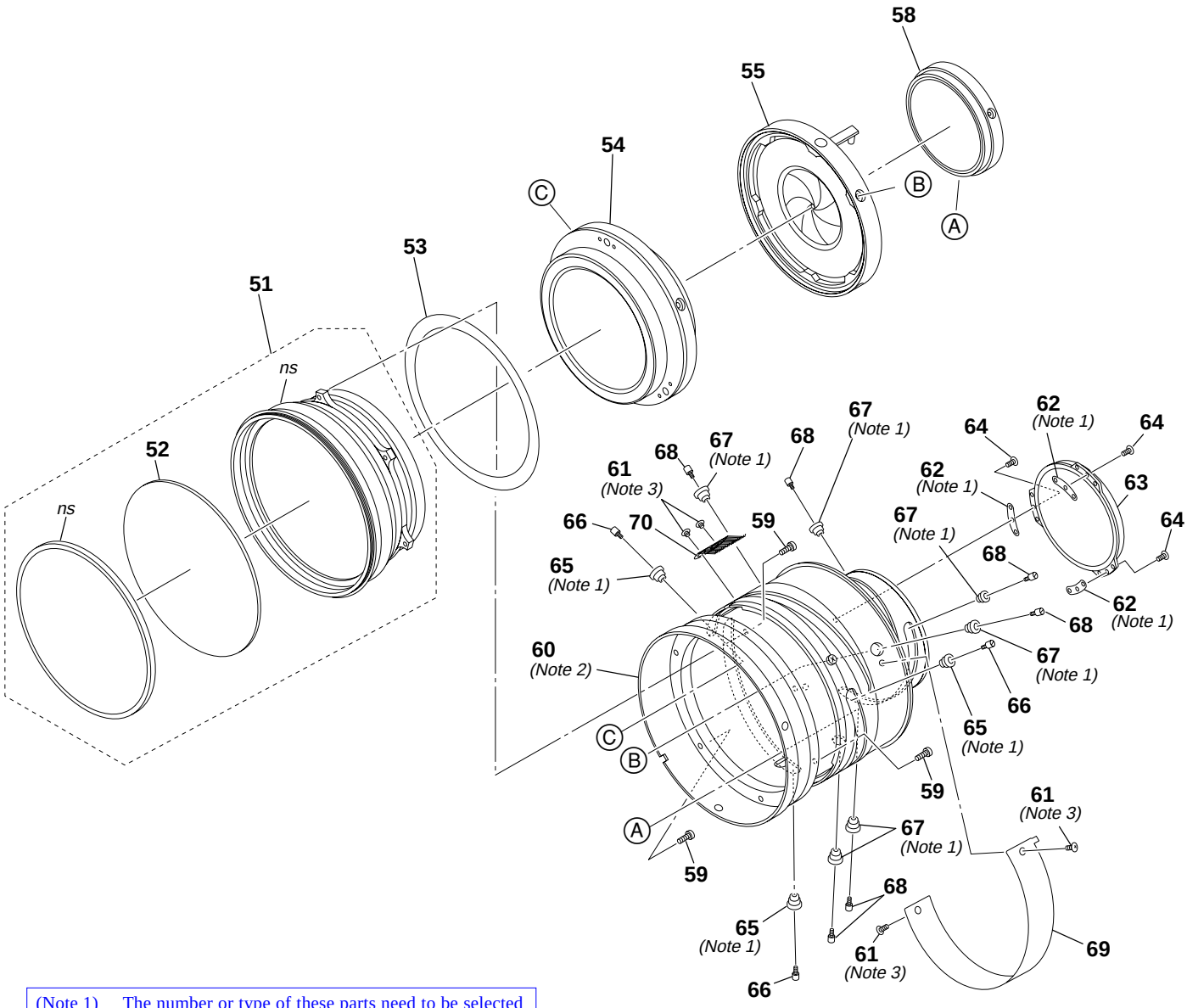
(Note 3) Remove the screw (Ref. No. 15) using the special driver.

(Note 2) The number or type of these parts need to be selected according to adjustment etc..
Select the part referring to page 3-3.

Ref. No.	Part No.	Description
1	A-1223-858-A	FRAME ASSY,SCREW FILTER (Note 1)
2	A-1224-100-A	RING ASSY,DRAW
3	2-897-789-01	PIN,GUIDE
4	2-897-980-01	SCREW (1P 1.7X3.5 C3C)
5	2-897-981-01	RING, FOCUS
6	2-898-026-01	BARREL BLOCK, FOCUS HOLD
7	2-898-004-01	SCREW (1P 2X5.5 C3C)
8	2-897-887-01	SCREW (2P 1.7X4 BNI)
9	A-1226-230-A	ASSY, PWB FLEXIBLE MAIN
10	2-898-117-01	SCREW (2P 1.7X2.2 BNI)
11	A-1224-099-A	RING ASSY, REAR
12	2-695-839-01	LABEL, MODEL NAME

Ref. No.	Part No.	Description
13	Selection parts	RING (A-C), PRESET (Note 2)
14	2-898-008-01	LEVER, FUNCTION
15	2-897-949-01	SCREW (3ULR-F M1.7X1.6 C3C) (Note 3)
16	2-898-009-01	SPRING, MAIN
17	2-898-010-01	GUIDE, MAIN SPRING
18	2-898-011-01	GUIDE, CONTACT FLEXIBLE
19	Selection parts	WASHER (A, B, D, F), FB ADJUSTMENT (Note 2)
20	2-898-016-01	COUPLER
21	2-886-787-01	COUPLER RECEIVE
22	2-898-017-01	BLOCK, MOUNT
23	2-898-020-01	RING BLOCK, LIGHT SHIELD
24	2-898-024-01	SCREW (2P 1.4X2.2 BNI)

3-1-2. 1, 2, 3 AND 4 LENS BLOCK



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

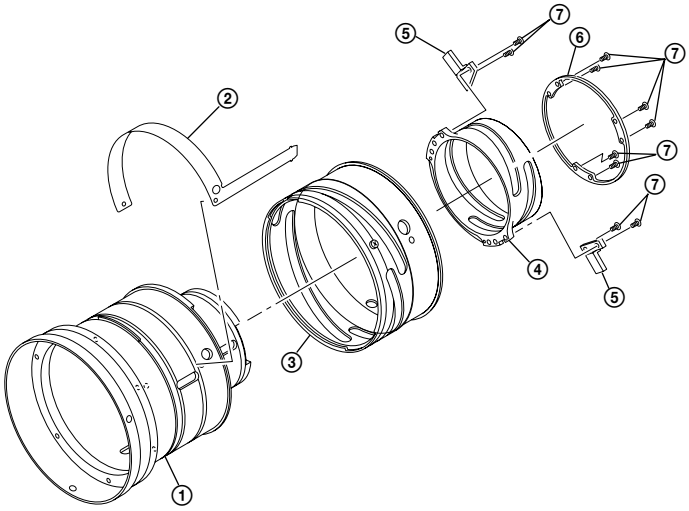
(Note 2) Refer to page 3-3 for detail of parts of the length grove barrel assy (Ref. No. 60).

(Note 3) Remove the screw (Ref. No. 61) using the special driver.

Ref. No.	Part No.	Description
51	A-1223-863-A	LENS BLOCK, 1
52	2-897-794-01	LENS, G01
53	2-897-805-01	SHEET,ORNAMENTAL 2
54	A-1223-877-A	LENS BLOCK, 2
55	2-897-892-01	BLOCK, IRIS
58	A-1224-031-A	LENS BLOCK, 3
59	2-897-950-01	SCREW (HEXAGONAL M2X5.5 C3C)
60	X-2177-204-1	LENGTH GROVE BARREL ASSY (Note 2)
61	2-897-949-01	SCREW (3ULR-F M1.7X1.6 C3C) (Note 3)

Ref. No.	Part No.	Description
62	Selection parts	WASHER (A, B, D), TILT ADJUSTMENT (Note 1)
63	A-1224-069-A	LENS BLOCK, 4
64	2-897-887-01	SCREW (2P 1.7X4 BNI)
65	Selection parts	ROLLER (C, K, L) , 2 (Note 1)
66	2-897-891-01	SCREW, 2 ROLLER
67	Selection parts	ROLLER (A, D), 3 (Note 1)
68	2-897-898-01	SCREW, ROLLER 3
69	2-897-972-01	SHEET, SCALE FOCUS
70	2-897-971-01	BRUSH, ZOOM

(Note 2) Length grove barrel assy consists of follows, do not disassemble the length grove barrel assy to make the most of the function.



① Length Grove Barrel
② F-ECD Flexible Board
③ Focus 1 Cam Ring Assy
④ Focus 2 Cam Ring Block
⑤ Focus Joint Plate
⑥ Cam Ring 2 Retainer
⑦ Screw (2P 1.7x3 C3C)

3-1-3. SELECTION PARTS

Ref. No.13

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

Part No.	Description
2-898-007-01	RING, PRESET A
2-898-007-11	RING, PRESET B
2-898-007-21	RING, PRESET C

Ref. No.19

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

Part No.	Description
2-898-012-01	WASHER, FB ADJUSTMENT A (t=0.02)
2-898-013-01	WASHER, FB ADJUSTMENT B (t=0.03)
2-898-014-01	WASHER, FB ADJUSTMENT D (t=0.1)
2-898-015-01	WASHER, FB ADJUSTMENT F (t=0.2)

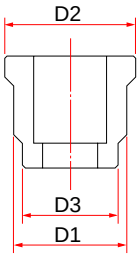
Ref. No.62

These washers are provided projective resolving power adjustment.
Change the thickness (t) according to result of adjustment.

Part No.	Description
2-897-850-01	WASHER, TILT ADJUSTMENT A (t=0.02)
2-897-851-01	WASHER, TILT ADJUSTMENT B (t=0.03)
2-897-852-01	WASHER, TILT ADJUSTMENT D (t=0.1)

Ref. No.65

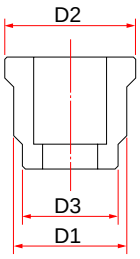
Select the type of part according to operation load of the associated parts.



Part No.	Description
2-897-888-01	ROLLER, 2 C (D1=3.99,D2=4.50,D3=3.50)
2-897-889-01	ROLLER, 2 K (D1=4.00,D2=4.52,D3=3.50)
2-897-890-01	ROLLER, 2 L (D1=4.01,D2=4.53,D3=3.50)

Ref. No.67

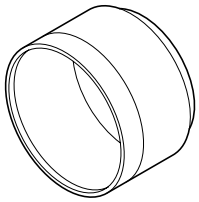
Select the type of part according to operation load of the associated parts.



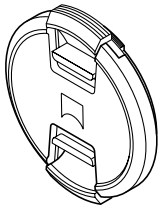
Part No.	Description
2-897-899-01	ROLLER, 3 A (D1=3.99,D2=4.50,D3=3.48)
2-897-900-01	ROLLER, 3 D (D1=3.99,D2=4.51,D3=3.48)
3-113-316-01	ROLLER, 3 K (D1=3.99,D2=4.51,D3=3.50)
3-113-317-01	ROLLER, 3 L (D1=3.99,D2=4.51,D3=3.52)
3-113-318-01	ROLLER, 3 M (D1=3.99,D2=4.51,D3=3.54)

3-2. SUPPLIED ACCESSORIES

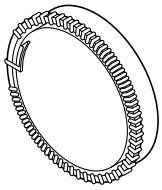
Checking supplied accessories.



Lens Hood (SH0003)
2-687-326-01



Front Lens Cap
X-2176-984-1



Rear Lens Cap
2-683-615-01

Lens Case
2-694-834-01

Other accessories

2-685-145-01 MANUAL, INSTRUCTION (JAPANESE, ENGLISH, FRENCH, SPANISH, SIMPLIFIED CHINESE)
2-685-145-11 MANUAL, INSTRUCTION (GERMAN, DUTCH, SWEDISH, ITALIAN) (AEP)
2-685-145-21 MANUAL, INSTRUCTION (PORTUGUESE, RUSSIAN, ARABIC, TRADITIONAL CHINESE, KOREAN) (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
- Lens Adjustment Program (ActuatorChecker.zip)
- PC Card Setup File (InstaCal.zip)
- Color Calculator 2

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

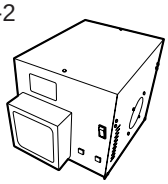
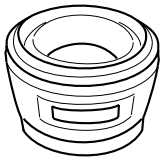
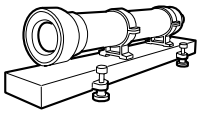
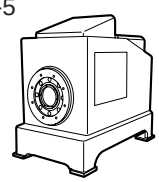
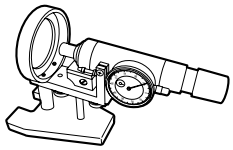
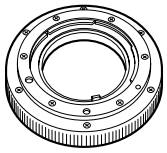
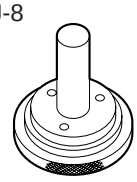
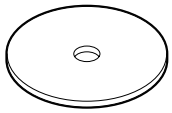
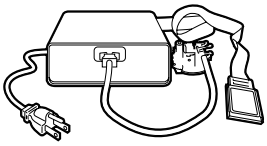
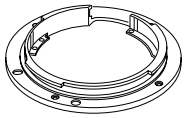
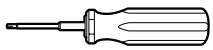
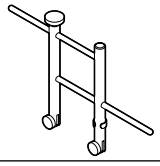
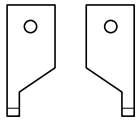
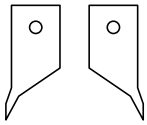
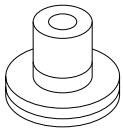
J-1  Personal computer (Note 1)	J-2  Luminance box J-6082-581-A	J-3  AE master lens J-6082-597-A
J-4  1000 mm Collimator 110V: J-6082-604-A 240V: J-6082-604-B (Note 2)	J-5  Lens test projector J-6082-605-A (Note 3)	J-6  Flange back tester J-6082-606-A
J-7  A-mount attachment J-6082-607-A	J-8  Flange back gauge (43.50mm) J-6082-608-A	J-9  Aberration measuring cap 77mm (SAL35F18Z) J-6082-648-A
J-10  Finished Inspection JIG J-6082-645-A (Note 4)	J-11  Open JIG J-6082-655-A	J-12  Special driver (D3LUF 88H) J-6082-654-A
J-13  Universal wrench J-6082-609-A	J-14  Chip-A for universal wrench J-6082-609-1	J-15  Chip-B for universal wrench J-6082-609-2
J-16  Filter screw frame removing tool J-6082-649-A		

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.

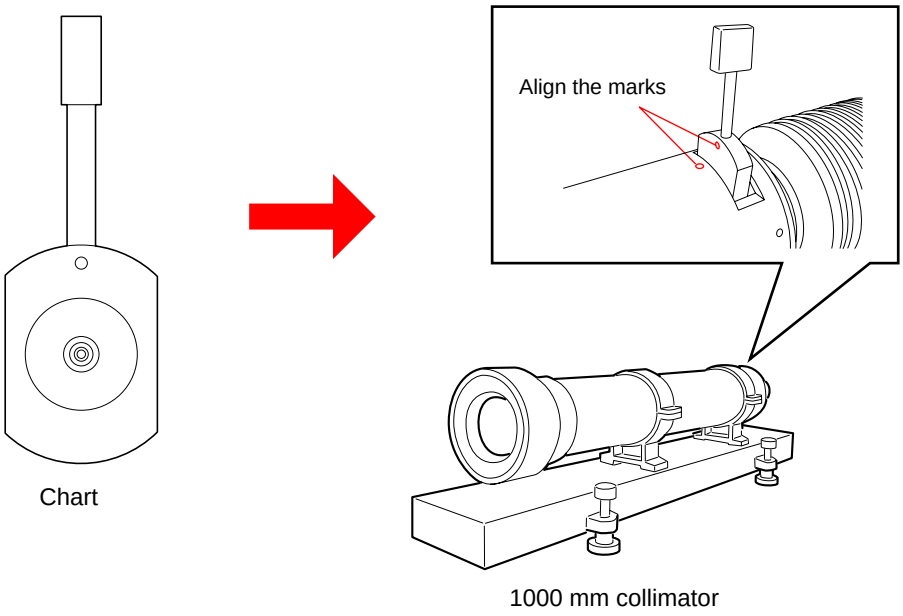


Fig.4-1-2

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.
4-5. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE)
4-7. LENS ROM CHECK
4-8. FOCUS BRUSH POSITION CHECK/ADJUSTMENT AND PATTERN CHECK
4-9. FOCUS HOLD BUTTON CHECK (FOCUS HOLD BUTTON)
4-10. FOCUS HOLD BUTTON CHECK (FOCUS HOLD BUTTON SHORT)
4-11. 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.exe) 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.zip)

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

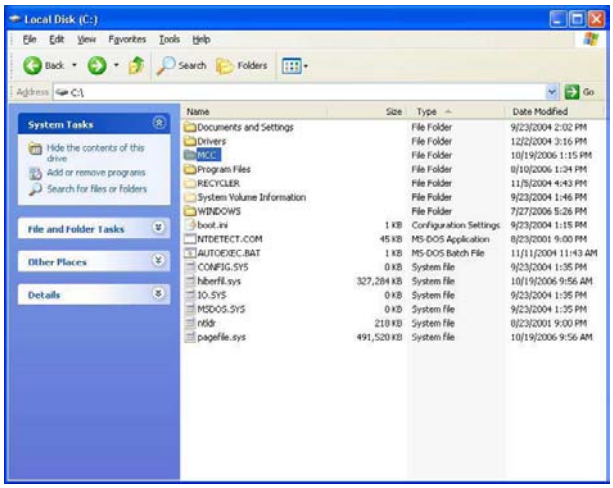


Fig.4-1-3

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.zip”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.

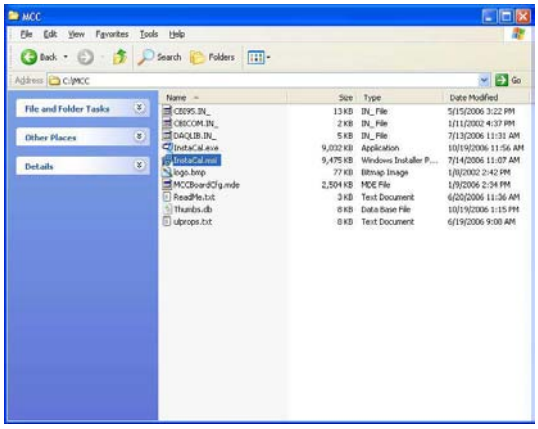


Fig.4-1-8

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>.

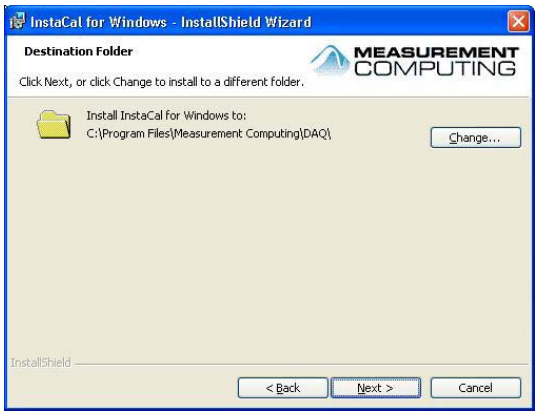


Fig.4-1-10

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

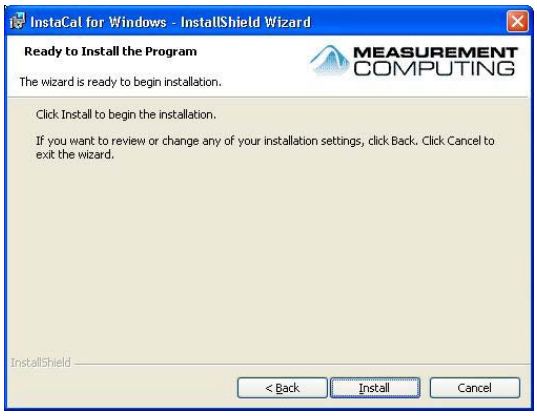


Fig.4-1-11

5) The installation is completed. Click Finish.

Note: To refer to the "readme" file, check the "Show the readme file" and click Finish.

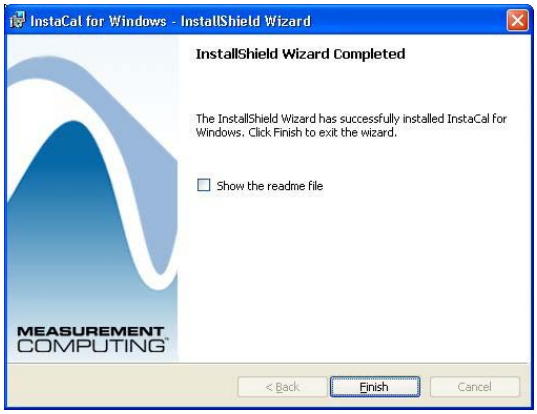


Fig.4-1-12

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” - “MeasumentComputing” - “InstaCal” from the startup menu, and start up the software.

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

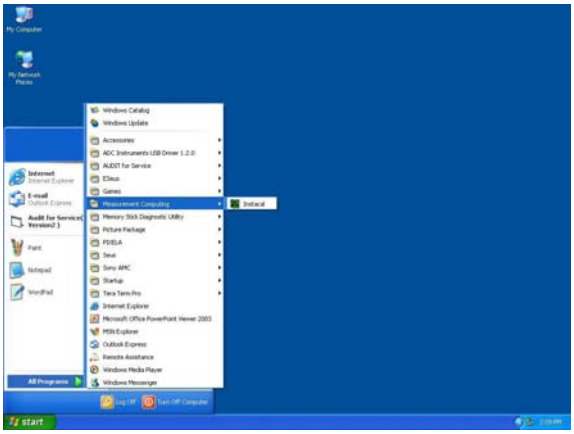


Fig.4-1-16

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.

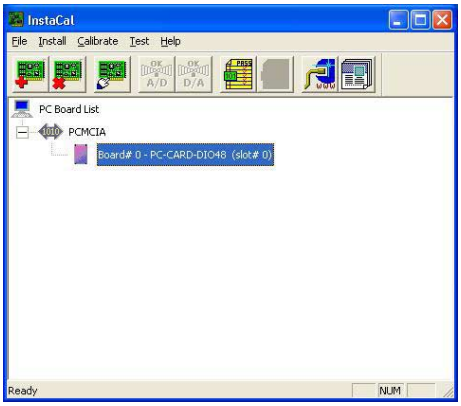


Fig.4-1-18

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.

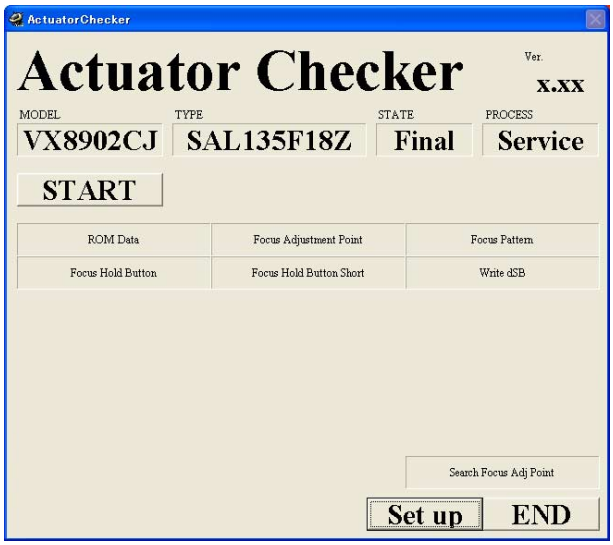


Fig.4-1-19

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

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

Equipment

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

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

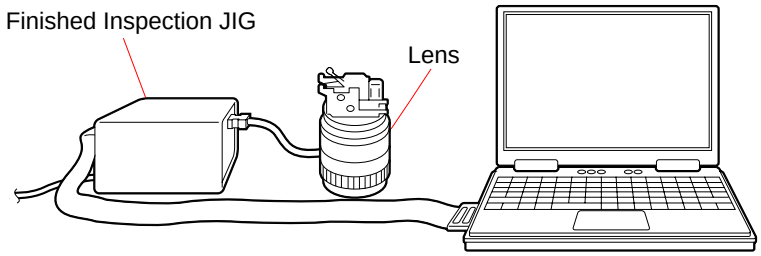


Fig.4-1-20

2. Turn on the finished inspection JIG.
3. Turn on the personal computer.
4. Start up “ActuatorChecker.exe” from an arbitrary folder, conform 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”.

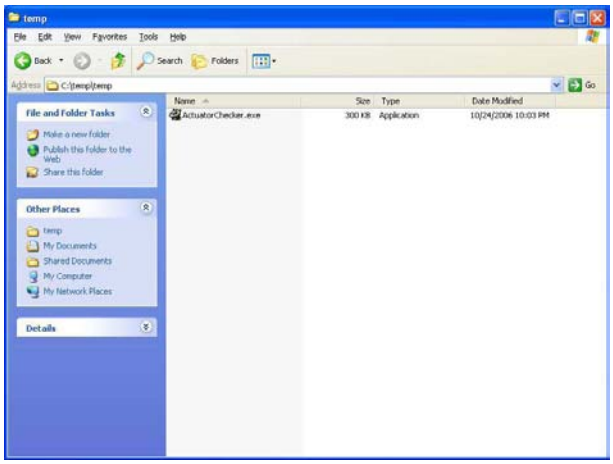


Fig.4-1-21

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.

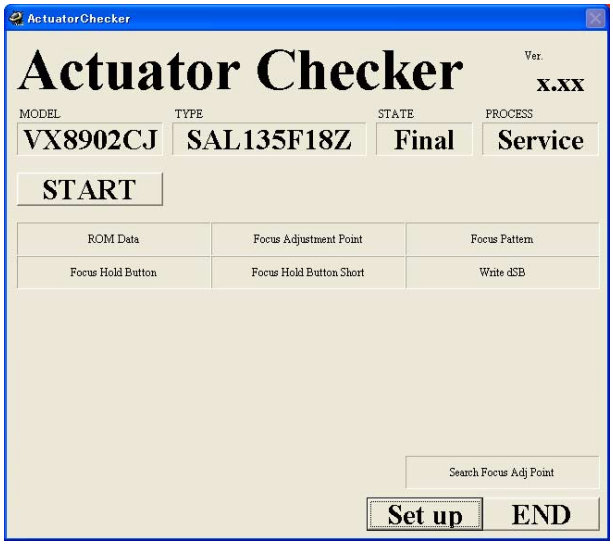


Fig.4-1-22

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].

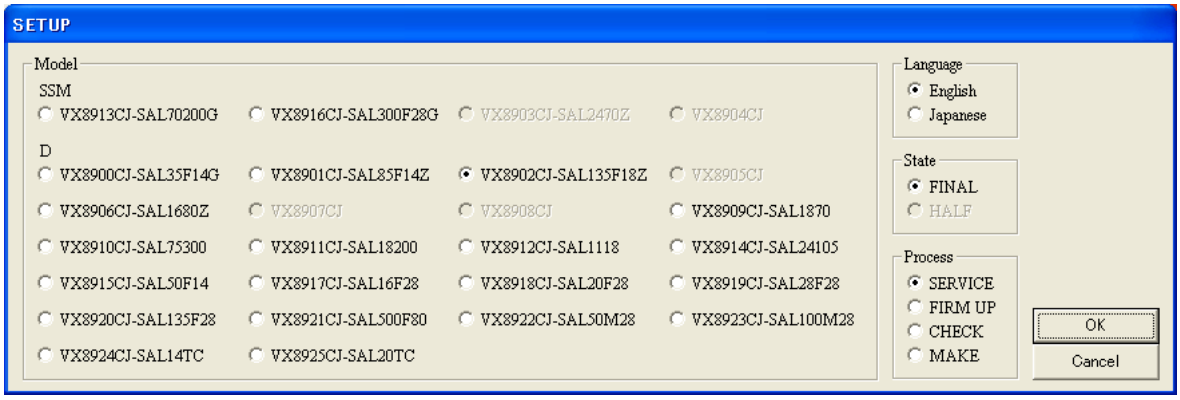


Fig.4-1-23

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

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

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

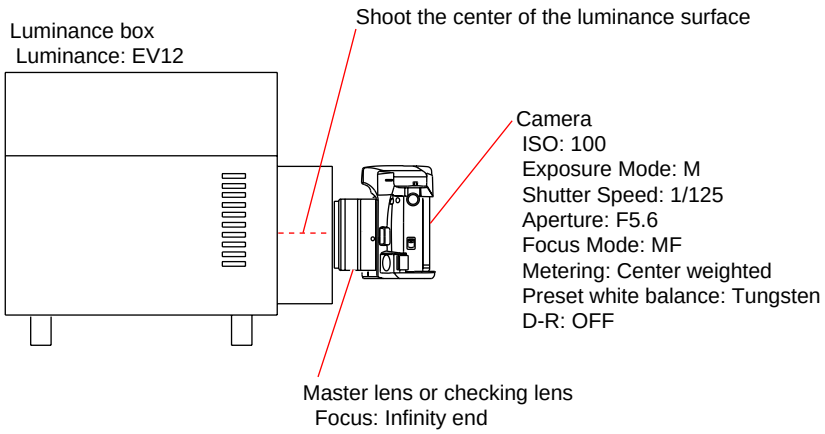


Fig.4-2-1

3) Shoot the images under the following conditions and save them.
   Note: Shoot the center of the luminance surface three times with the master lens and checking lens.

Setting of Luminance box:

Luminance:	EV12

Setting of Lens:

Focus:	Infinity end

Setting of Camera:

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

2. Checking of Image

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

1) Start the Color Calculator 2.

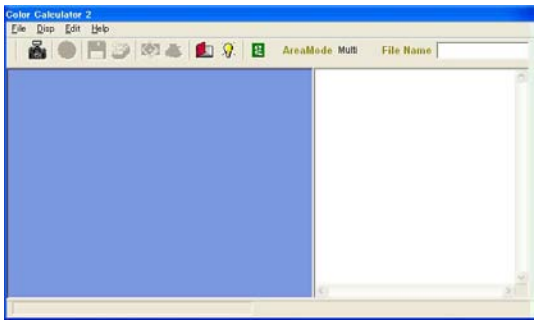


Fig.4-2-2

2) Read the image from the file menu.

Fig.4-2-3

3) Set the Color Calculator 2 as follows.
Measured value display (Display menu): RGB+L*a*b*
Measuring method (Display menu): Center Single Area

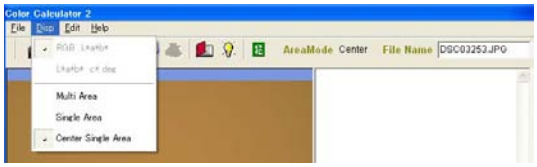


Fig.4-2-4

Color space (Edit menu): sRGB

Fig.4-2-5

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

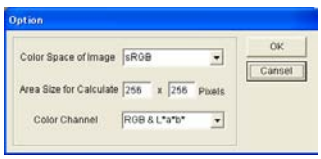


Fig.4-2-6

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

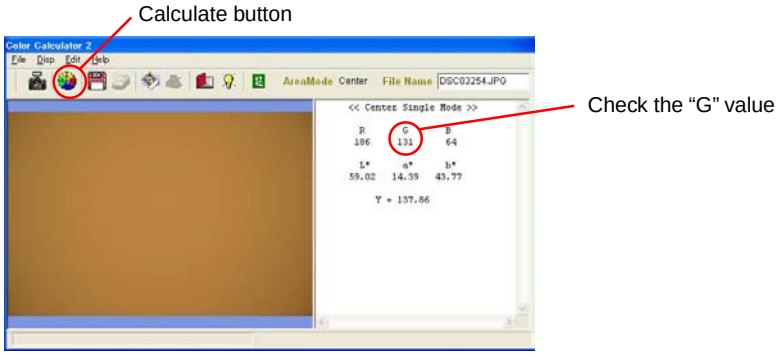


Fig.4-2-7

3. Checking Method

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

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

Specification

Aperture error = 0 ±12

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

4-2-2. Aperture Diameter Adjustment

Equlpment

- Adhesive bond (B-10): J-6082-612-A
- Open JIG
- Special driver

1. Preparation

1) Remove the light shield ring block and contact flexible.

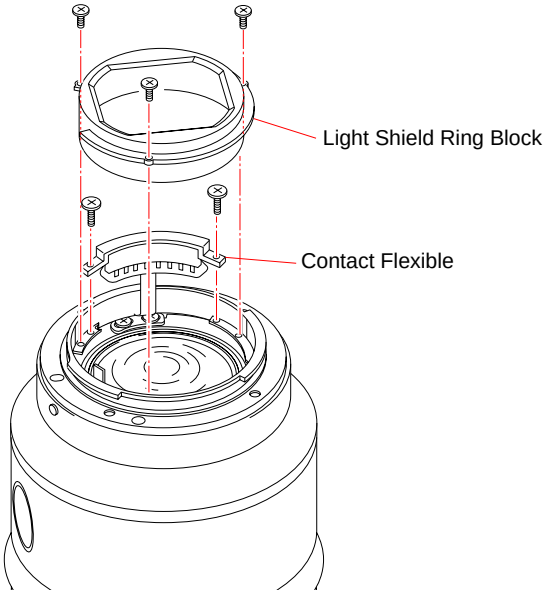


Fig.4-2-8

2) Remove the mount block, FB adjustment washer and coupler.

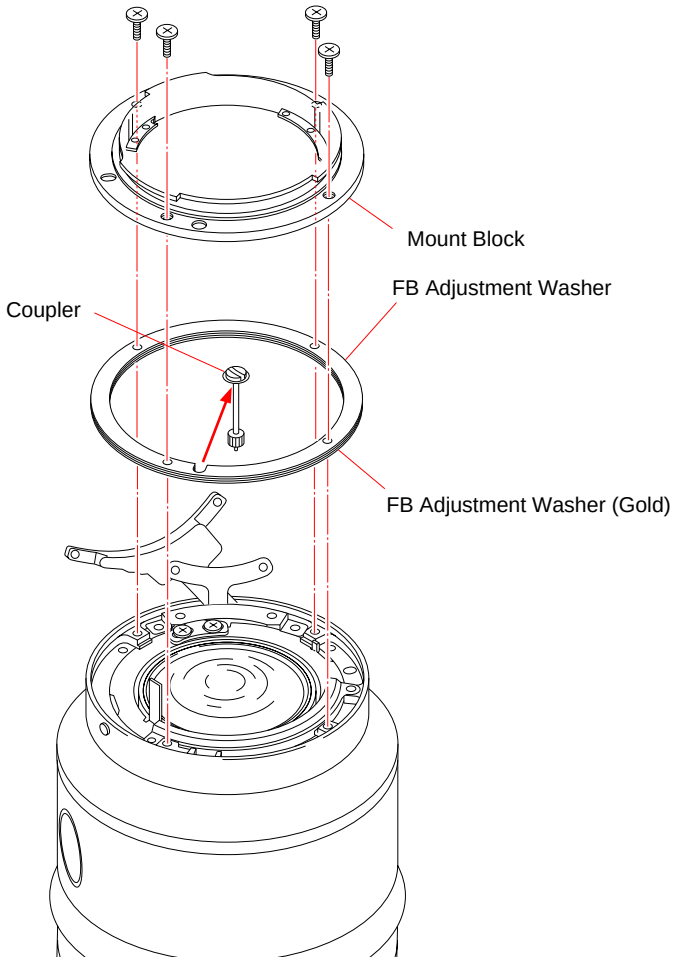


Fig.4-2-9

3) Attach the open JIG.
4) Move the preset lever to set preset ring at the open aperture position.
5) Two screws that are the fixation of the function lever in the preset ring are loosened.

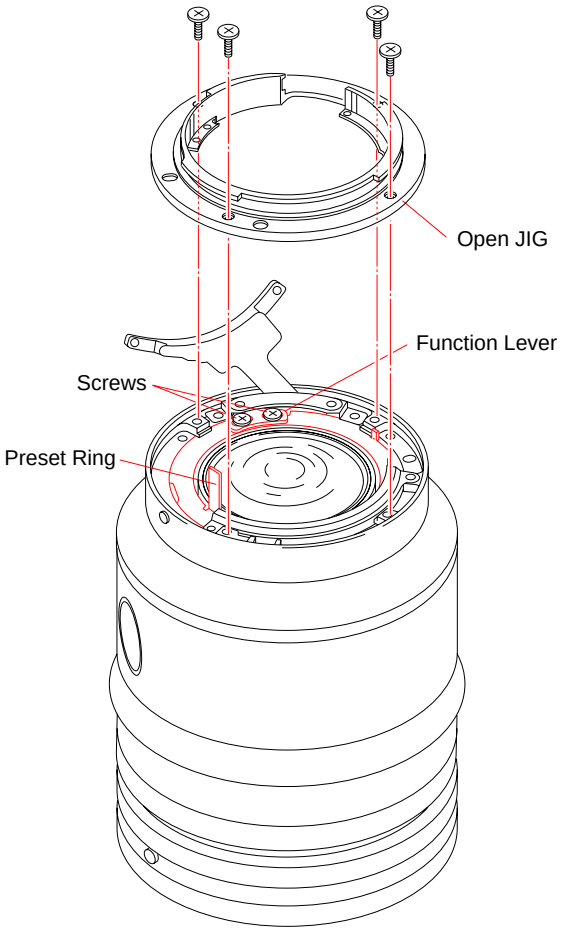


Fig.4-2-10

2. Adjusting Method

1) Observing the iris blades from the lens mount side, adjust the position of function lever so that the iris blades just start to be hidden completely. Then, tighten the function lever with two screws. (Use the special driver: J-6082-654-A)
2) Attach the contact flexible and light shield ring block.
3) Perform “4-2-1. Aperture Diameter Check”, repeat this step until the tolerance of aperture error the specification.
4) After finishing the adjustment, apply the adhesive bond (B-10) to the heads of two screws.
   Adhesive bond (B-10): J-6082-612-A

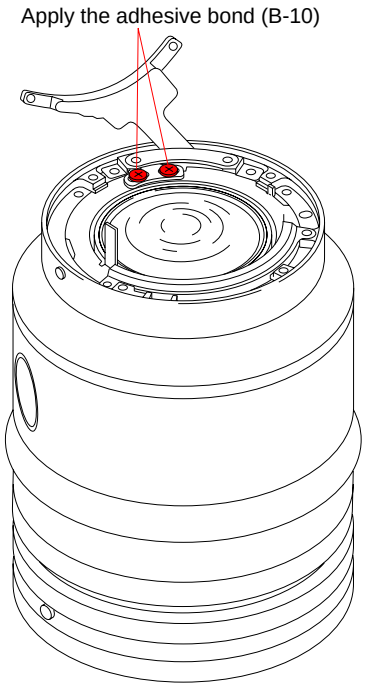


Fig.4-2-11

5) Remove the light shield ring block, contact flexible and Open JIG.
6) Attach the coupler, FB adjustment washer, contact flexible and light shield ring block, assemble the state of near completion.

4-3. PROJECTIVE RESOLVING POWER CHECK

Equipment

- Lens Test Projector and Variable Transformer (Output voltage: AC 100 V)
  Note: Connect the variable transformer (Output voltage: AC 100 V) to the lens test projector.

- A-mount Attachment
- Screen (Art paper)
- Tape Measure
- Plane Mirror (For SLRs)

1. Preparations

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

Focal-length f (mm)	Distance (m)
135	5.4

Table 4-3-1

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

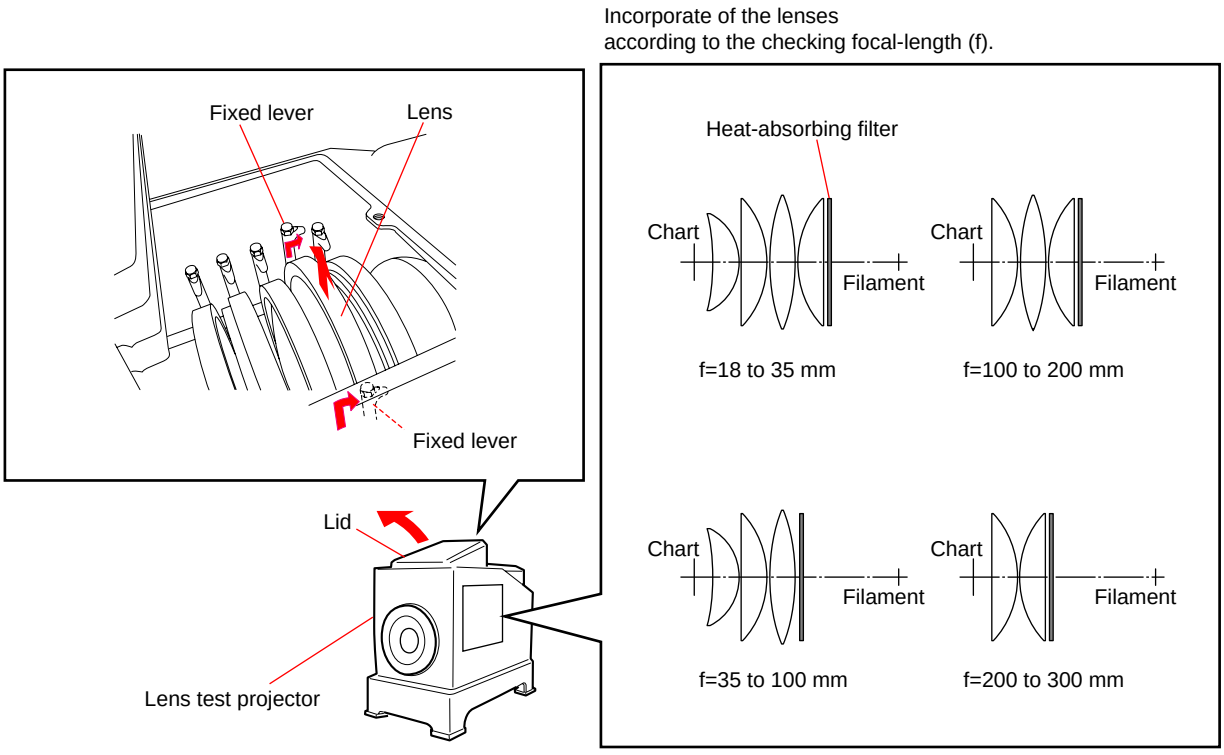


Fig.4-3-1

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

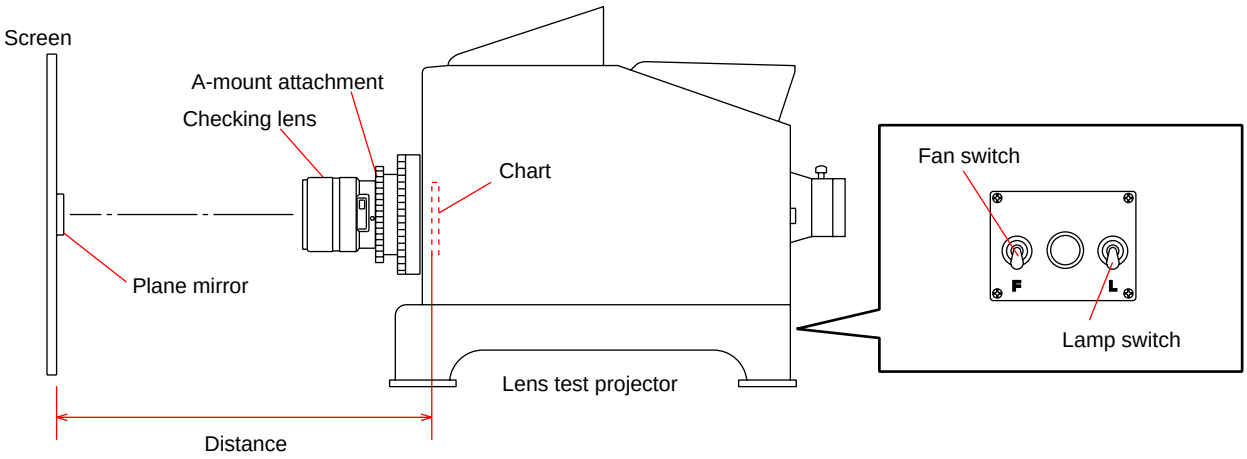


Fig.4-3-2

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

2. Checking Method

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

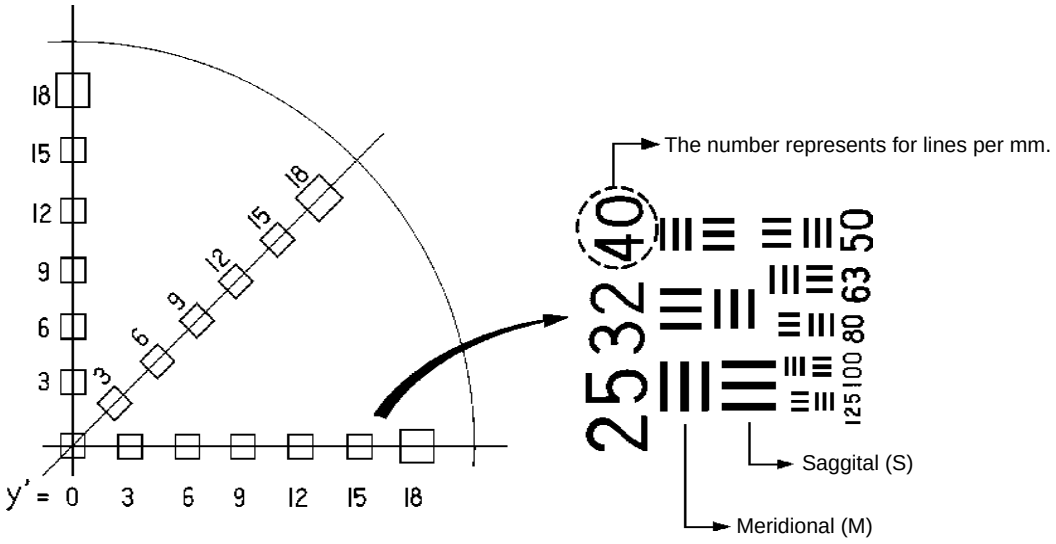


Fig.4-3-3

3) Turn the mount rotation ring of lens test projector until the projected image at a certain peripheral point (y'= 15, y'= 18) 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.

Correct resolution Spurious resolution

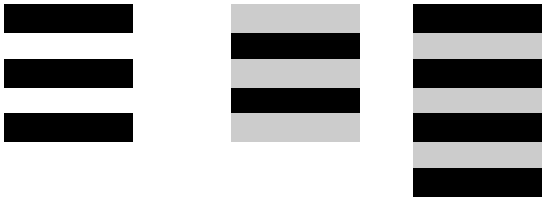


Fig.4-3-4

4) Check that the all readings (y'= 0, saggital (S) and meridional (M) at y'= 15, 18) is within the specification of the Table 4-3-3.

When the checking lens is out of specification of the Table 4-3 3, perform the following adjustment.
Remove the three screws from the front of the lens block 4.
Remove the lens block 2 from the removing frame 2, insert the tilt adjustment washer to front pin side of the lens block 2.

Tilt Adjustment Washer

Part No.	Description	Thickness (mm)
2-897-850-01	Tilt adjustment washer A	0.02
2-897-851-01	Tilt adjustment washer B	0.03
2-897-852-01	Tilt adjustment washer D	0.1

Table 4-3-2

Specification

Focal-length f (mm)	Distance (m)	Number of the smallest pitched lines				
		Center (y' = 0) (Lines per mm)	Peripheral (y' = 15) (Lines per mm)		Peripheral (y' = 18) (Lines per mm)	
			S	M	S	M
135	5.4	125 or greater	100 or greater	100 or greater	100 or greater	100 or greater

Table 4-3-3

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

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

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

Equipment

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

1. Preparations

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

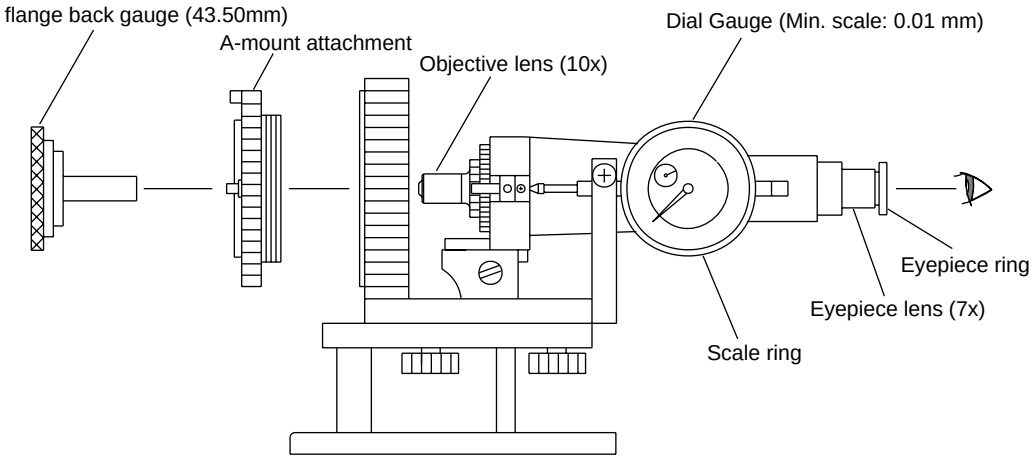


Fig.4-4-1

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

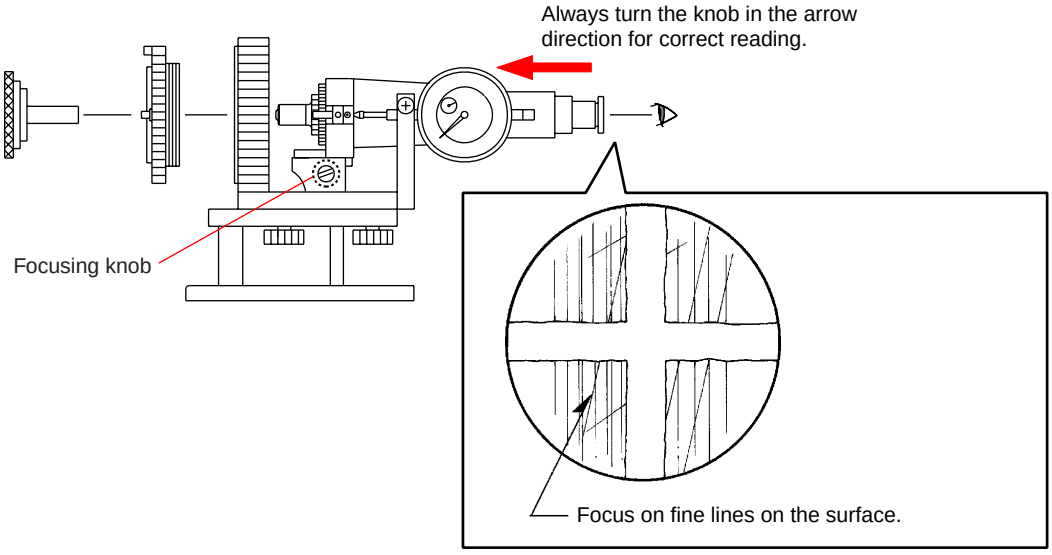


Fig.4-4-2

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

2. Frange Back (f'F) Check

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

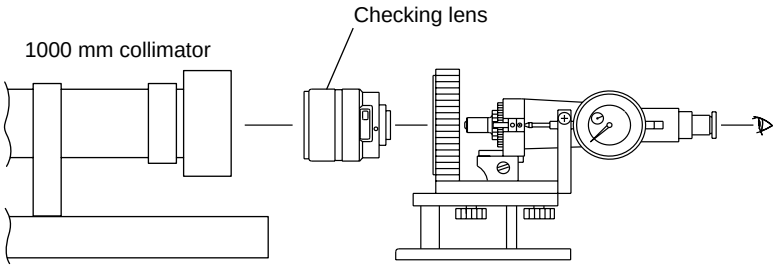


Fig.4-4-3

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.)
   *: When optical axis aligns with the chart is not center, perform the following adjustment.
   Remove the lens block 4, adjust the tilt adjustment washer by varying in quantity.

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

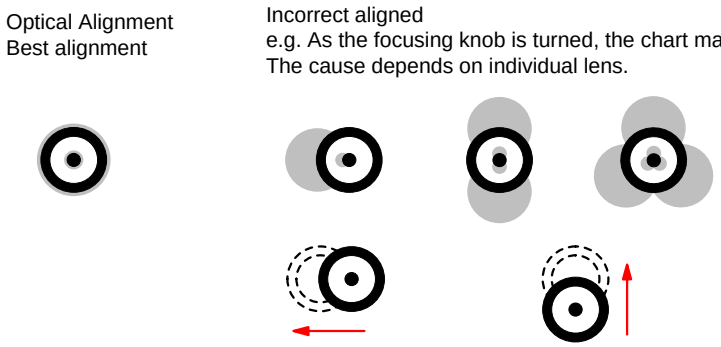


Fig.4-4-4

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

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

Specification

Focal-length f (mm)	f'F (mm) (Infinity position)
135	44.90 to 44.94

Table 4-4-1

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

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

Equipment

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

Adjusting Method

1) Perform steps 1) to 3) in the confirmation procedure.
2) Confirm the value of flange back of lens to be checked. This value is called "A".
   Using the formula below, calculate the thickness of FB adjustment washer to be increased or decreased.

Thickness of FB adjustment washer to be increased or decreased= A – 44.92

   In case of "+" : Add the FB adjustment washer of thickness calculated by the above formula.
   In case of "–" : Remove the FB adjustment washer of thickness calculated by the above formula.
   Example)
   In case of + 0.1 mm calculated by formula: Add the FB adjustment washer of 0.1 mm thickness.
   In case of – 0.1 mm calculated by formula: Remove the FB adjustment washer of 0.1 mm thickness.
3) Remove the α mount, and according to the above formula increase or decrease the FB adjustment washer.
   Select from 4 types of FB adjustment washer in the table below.

FB Adjustment Washer

Part No.	Description	Thickness(mm)
2-898-012-01	WASHER, FB ADJUSTMENT A	0.02
2-898-013-01	WASHER, FB ADJUSTMENT B	0.03
2-898-014-01	WASHER, FB ADJUSTMENT D	0.1
2-898-015-01	WASHER, FB ADJUSTMENT F	0.2

Table 4-4-2

4) After replacing the FB adjustment washer, confirm that the specification is met.

Ver. 1.4 2007.12

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

4-5. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE)

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 77mm (SAL135F18Z)

1. Preparations

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

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 77mm on the tip of lens as shown in the Fig.4-5-1, then measure the flange back (f’F).

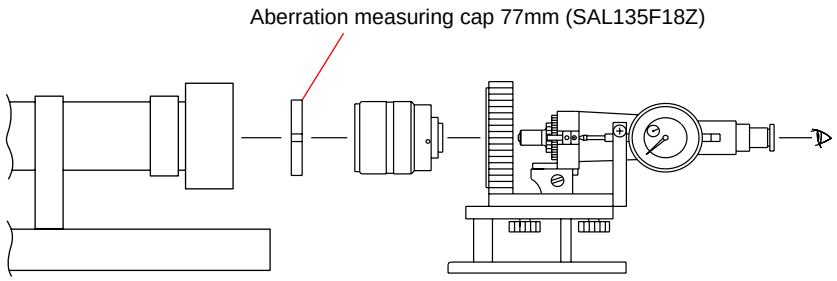


Fig.4-5-1

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 77mm).

Focus-shift = Flange back (f’F) reading (using aberration measuring cap 77mm) - flange back (f’F) of open aperture reading

Specification

Focus-shift (mm) = – 0.05 to +0.13

4) Perform the “4-11. WRITE dSB”.

4-6. TORQUE RING PLAY ADJUSTMENT

To meet the adjustment conditions below, adjust the amount of play of torque ring.

Adjustment Condition

1) Observing the focus scale through the distance scale window, move the torque ring in the arrow direction by hand. At this moment, the focus scale should move following the movement of torque ring without delay.
2) When turning the coupler at the lens mount side with Philips screwdriver, in all distances from the infinite end to the near end, the torque ring never rotates and only the focus scale should moves following the movement of coupler without delay.

Adjustment Procedure

If the above adjustment condition is not met, adjust the eccentric pins at three locations.

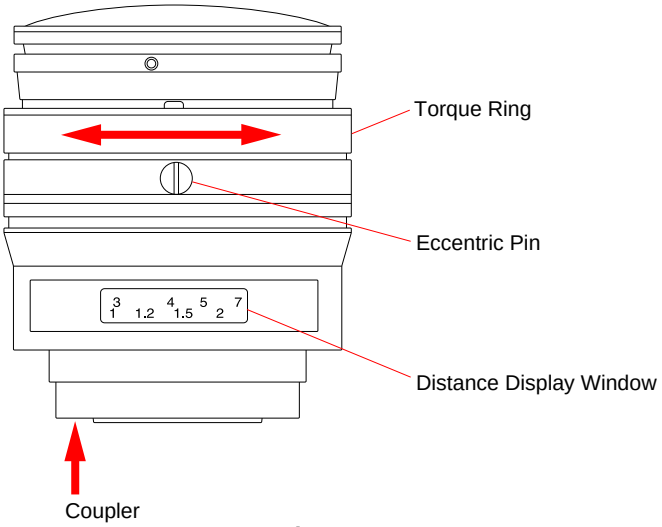


Fig.4-6-1

4-7. LENS ROM CHECK

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 [ROM Data].

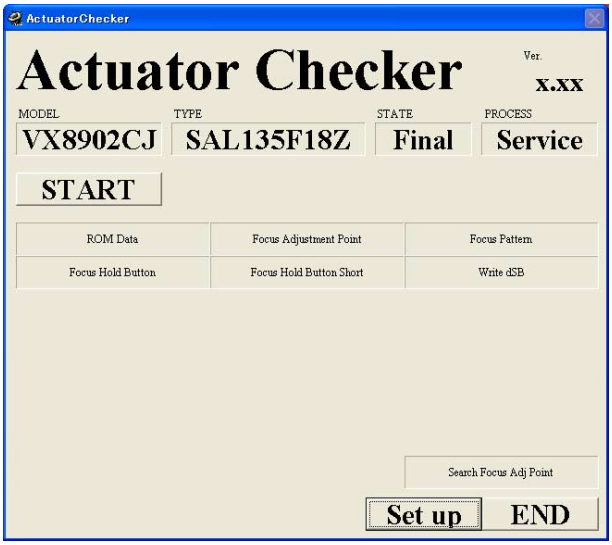


Fig.4-7-1

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.4-7-2

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.

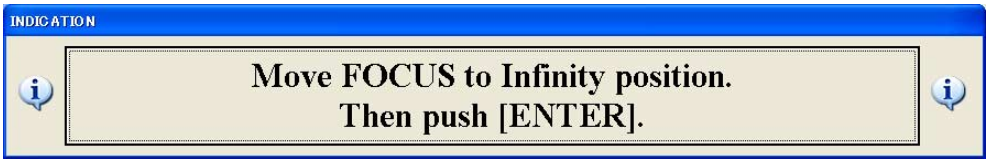


Fig.4-7-3

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

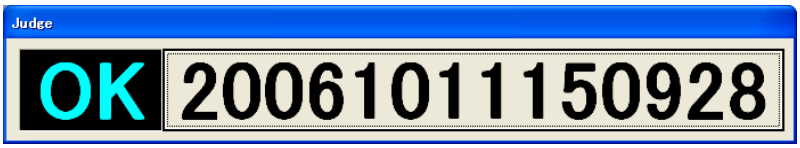


Fig.4-7-4

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.

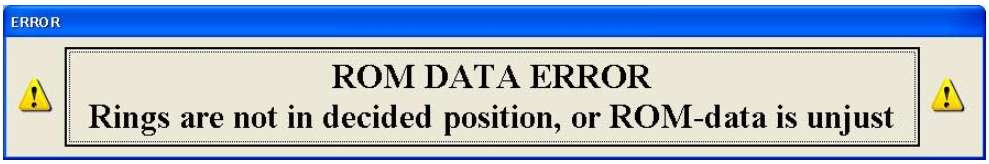


Fig.4-7-5

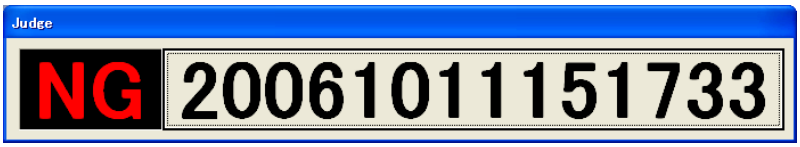


Fig.4-7-6

2) Although the lens is positioned at the infinity position, if the “NG” appears, confirm or perform the following.
- 4-8-1. Focus Brush Position Adjustment
- Cleaning of flexible pattern or the brush.
- Replaceing the brush.
- Replaceing the main flexible unit.

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

4-8. FOCUS BRUSH POSITION CHECK/ADJUSTMENT

4-8-1. Focus Brush Position Adjustment

Equipment

- Special driver
- Adhesive bond (B-10)

Focus Brush Position Adjustment

1) Disassemble the checking lens into the state of Fig.4-8-1.

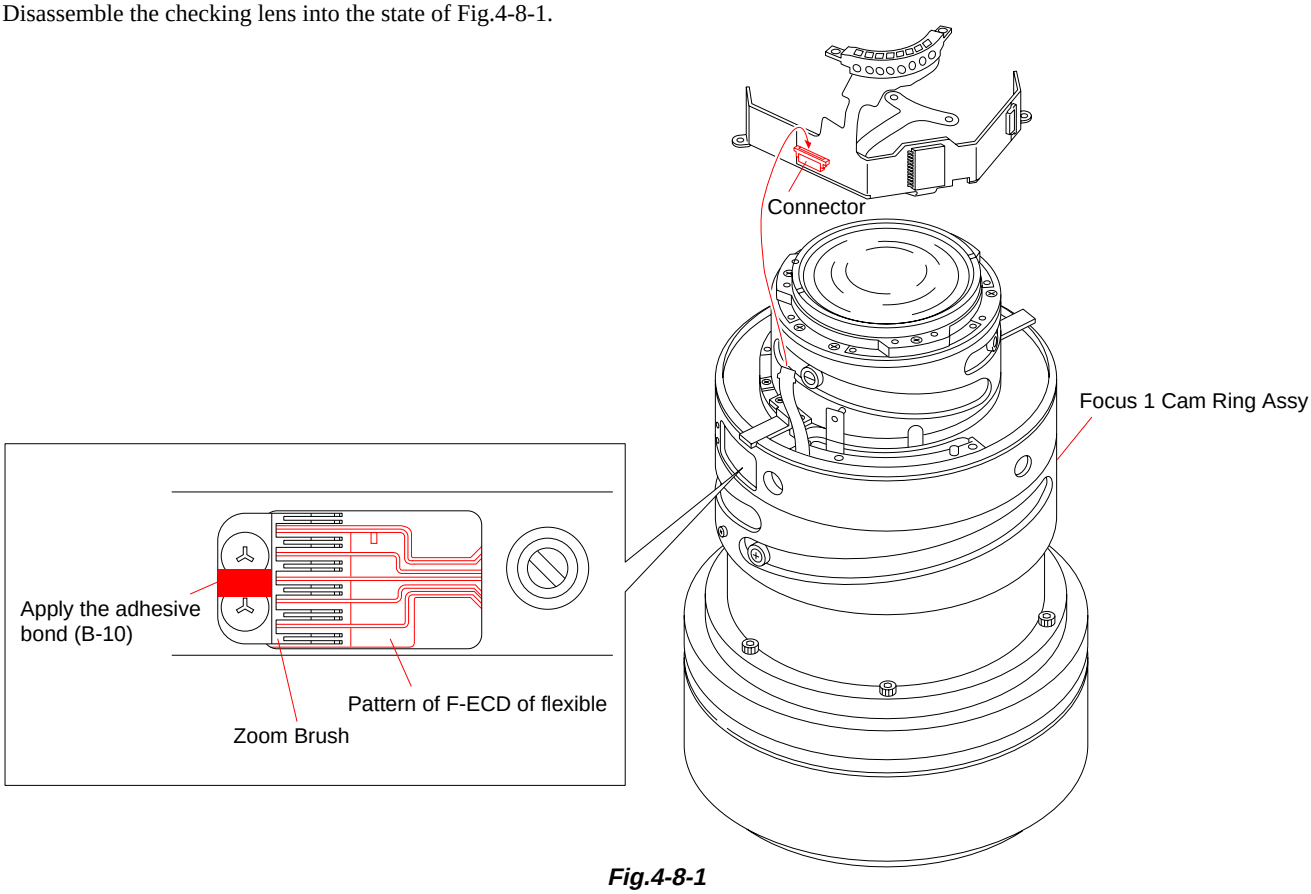


Fig.4-8-1

2) Set the focus to the infinite end.
3) Check the conduction between first pattern and second pattern from top as shown in figure.
   - When the brush comes to the area circled where no pattern exists, no conduction occurs. (Adjusted)
   - When the brush comes to the area circled where the pattern exists, the conduction occurs. (Not adjusted)

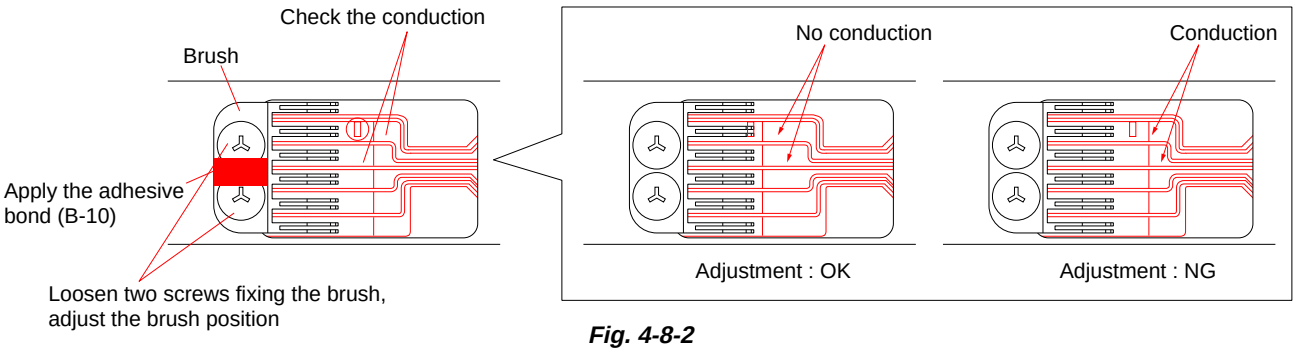


Fig. 4-8-2

4) If not adjusted in step 3), loosen two screws fixing the brush (For focus ring), and adjust the brush position, perform step 2) and 3) again.
5) After adjustment, apply the adhesive bond (B-10) to portions shown in Fig.4-8-1.
6) After adjustment, perform the [2 Focus Brush Position Check] and [3 Pattern Check].

4-8-2. Focus Brush Position Check (Focus Adjustment Point)

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 [Focus Adjustment Point].

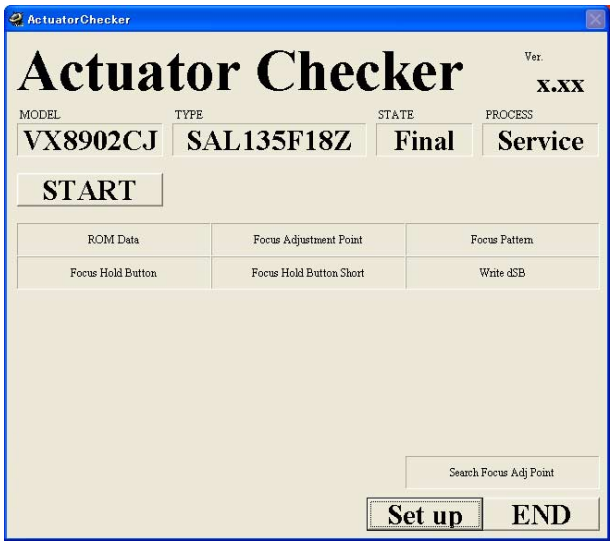


Fig.4-8-3

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.

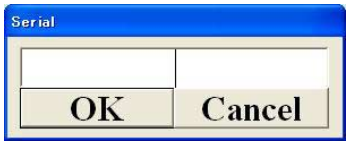


Fig.4-8-4

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.

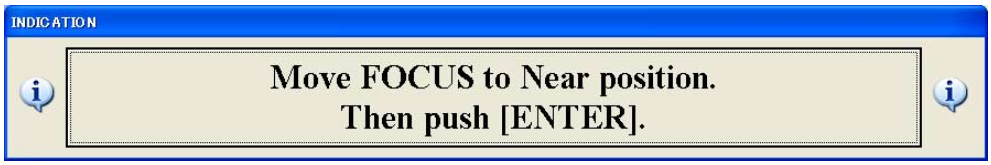


Fig.4-8-5

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.

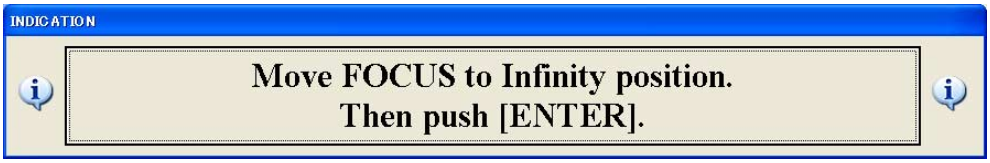


Fig.4-8-6

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.

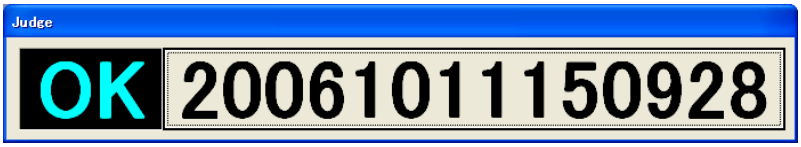


Fig.4-8-7

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

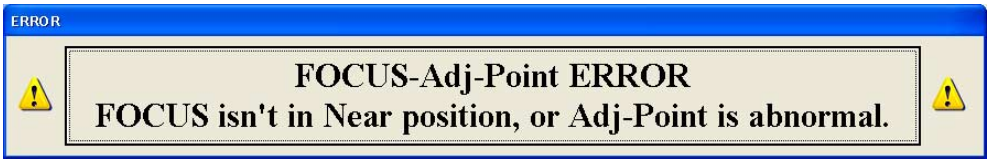


Fig.4-8-8

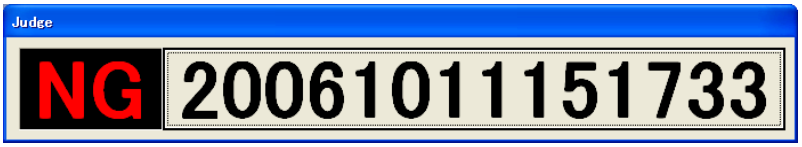


Fig.4-8-9

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

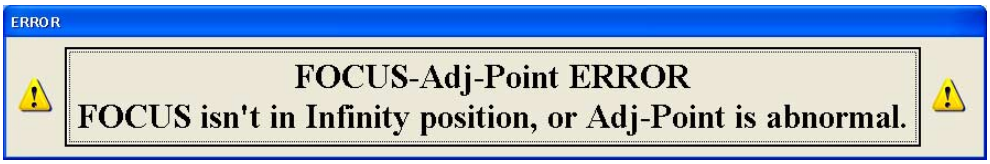


Fig.4-8-10

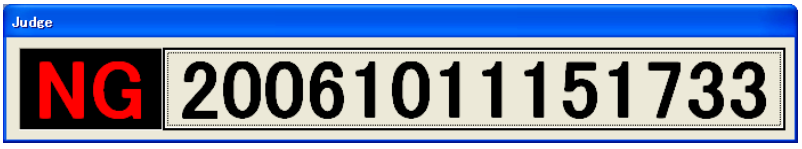


Fig.4-8-11

2) Although the lens is positioned at the near position or the infinity position, if “NG” appears, confirm or perform the following.
   - 4-8-1. Focus Brush Position Adjustment
   - Cleaning of flexible pattern or the brush.
   - Replaceing the brush.

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

4-8-3. Focus Brush Pattern Check(Focus Pattern)

Equipment

- Personal Computer
- Finished Inspection JIG (**AC 100 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 Pattern].

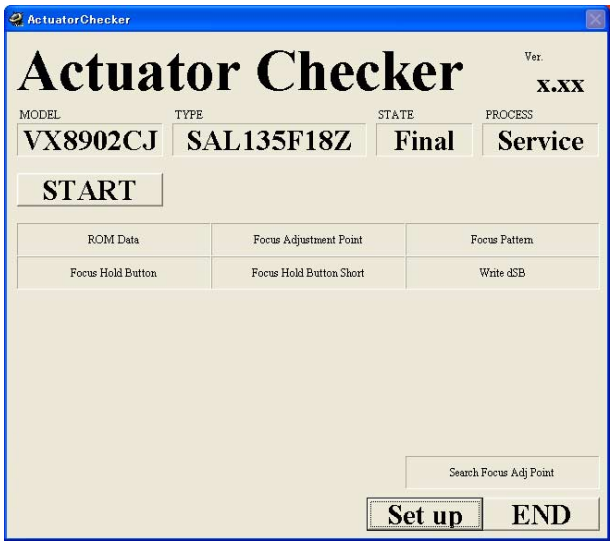


Fig.4-8-12

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.4-8-13

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.

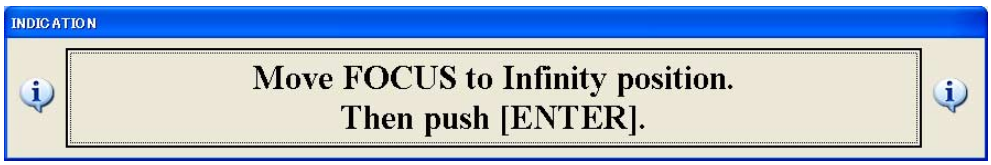


Fig.4-8-14

4) When the infinity position check finishes normally, the messege “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.4-8-15

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.

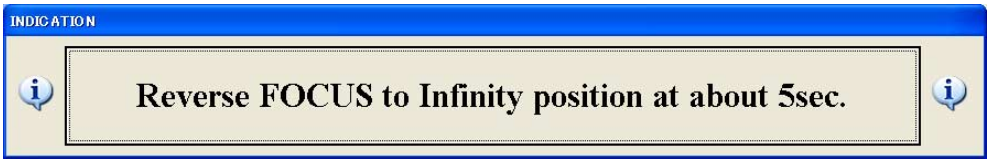


Fig.4-8-16

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.

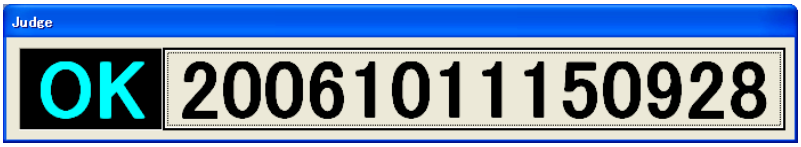


Fig.4-8-17

3. 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, press the ENTER key to return to the initial window, and perform “2. Checking Method”again.

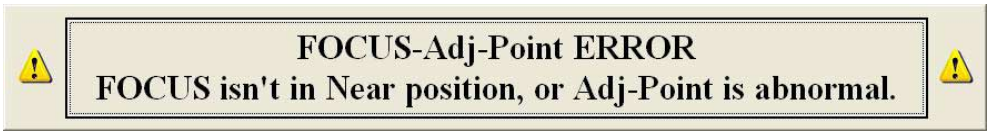


Fig.4-8-18

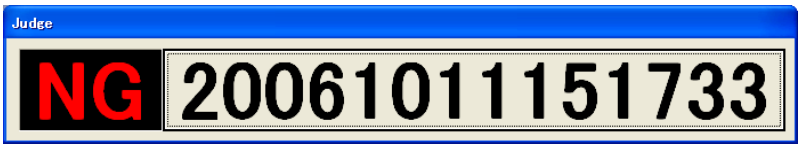


Fig.4-8-19

2) Although the lens is positioned at the near position, if “NG” appears, confirm or perform the following.
- 4-8-1. Focus Brush Position Adjustment
- Cleaning of flexible pattern or the brush.
- Replaceing 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 (infinity 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 infinity position can be done in more than 5 seconds and no more than 10 seconds.

- When the focus pattern error

Fig.4-8-20

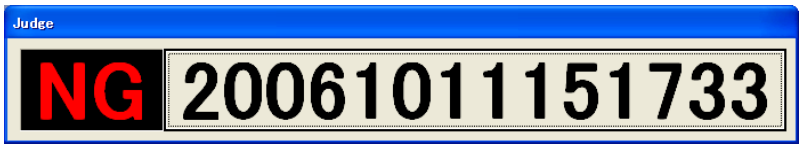


Fig.4-8-21

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

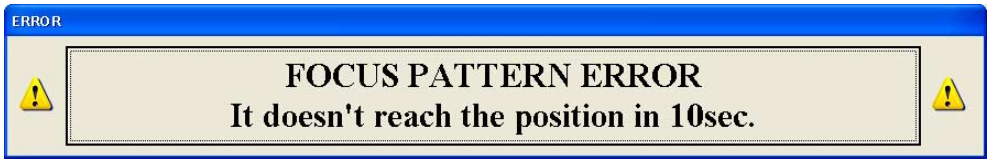


Fig.4-8-22

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

4-9. FOCUS HOLD BUTTON CHECK (FOCUS HOLD BUTTON)

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 Focus Hold Button.

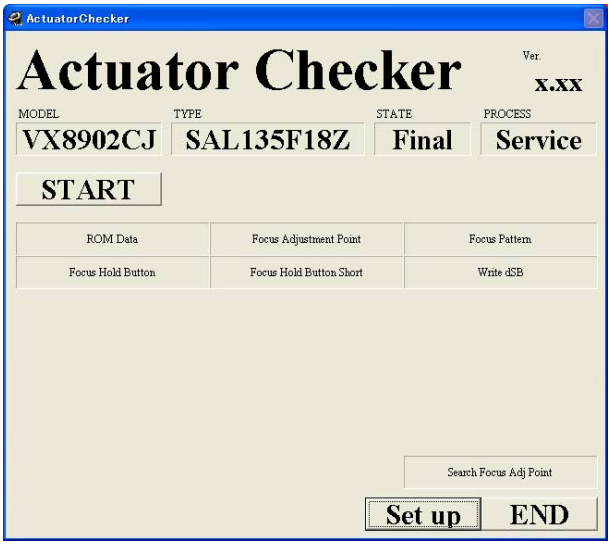


Fig.4-9-1

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 “Push [FOCUS HOLD] button once softly.” is displayed on the pop-up window.
Press the focus hold button.

Fig.4-9-3

4) When the focus hold button check finishes normally, “OK” is displayed on the pop-up window.

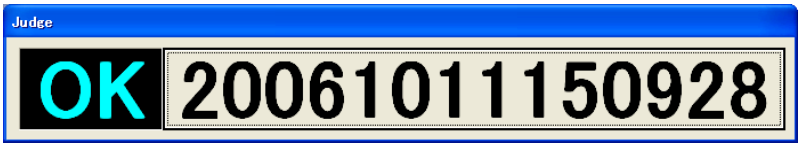


Fig.4-9-4

3. In case of error display in the Focus Hold Button

1) When the Focus Hold Button cannot be pressed within a certain period of time or the button is defective, the window below appears.

Fig.4-9-5

2) In case of error caused by time-out of key pressing, perform the work with caution so as to press the focus hold button within a certain period of time.
3) Although the button is pressed within a certain period of time, if the error occurs, replace the focus hold barrel block.
4) Perform “2. Checking Method”again, repeat the inspection until “OK” appears on the pop-up window.

4-10. FOCUS HOLD BUTTON CHECK (FOCUS HOLD BUTTON SHORT)

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 [Focus Hold Button Short].

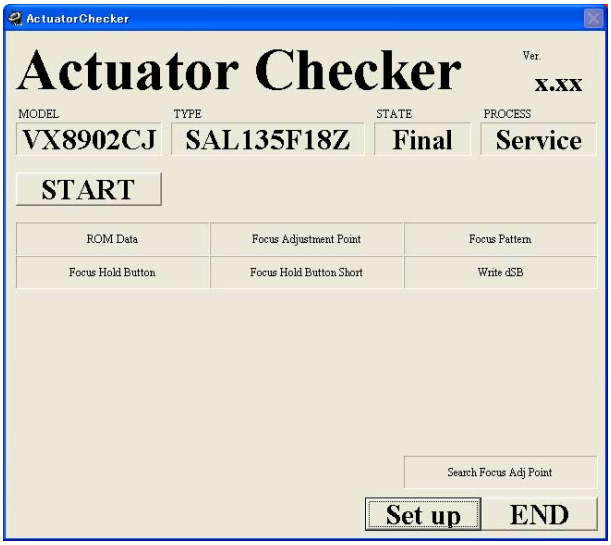


Fig.4-10-1

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.4-10-2

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.

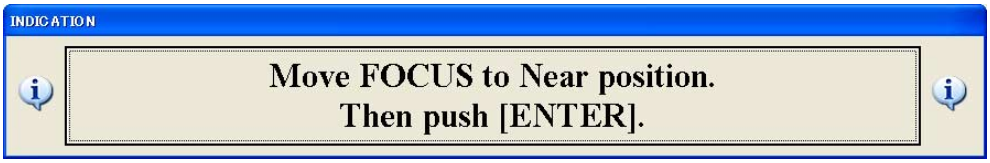


Fig.4-10-3

4) When the near position check finishes normally, the messege “Move 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.

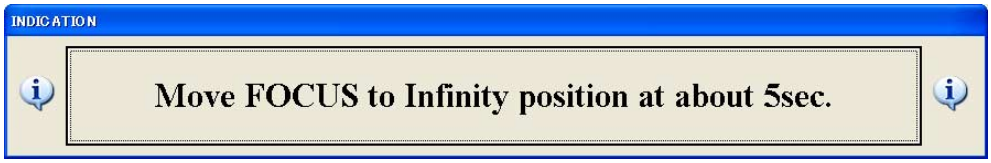


Fig.4-10-4

5) When the focus hold button check finishes normally, “OK” is displayed on the pop-up window.

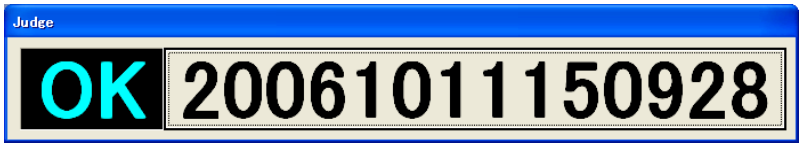


Fig.4-10-5

3. In case of error display in the Focus Hold Button Short (near position)

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.4-10-6

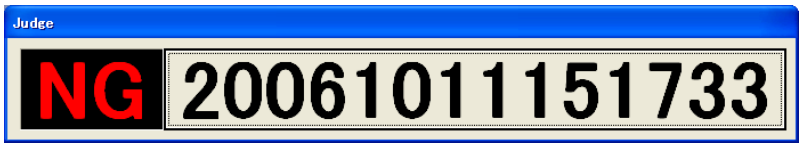


Fig.4-10-7

2) Although the lens is positioned at the near position, if “NG” appears, confirm or perform the following.
- 4-8-1. Focus Brush Position Adjustment
- Cleaning of flexible pattern or the brush.
- Replaceing 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 Hold Button Short (infinity 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 infinity position can be done in more than 5 seconds and no more than 10 seconds.

Fig.4-10-8

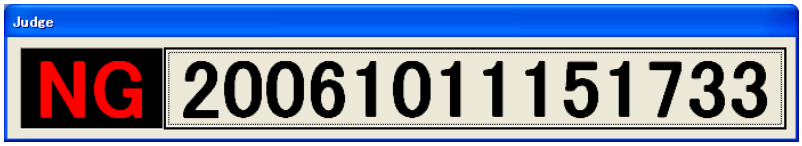


Fig.4-10-9

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

4-11. 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].

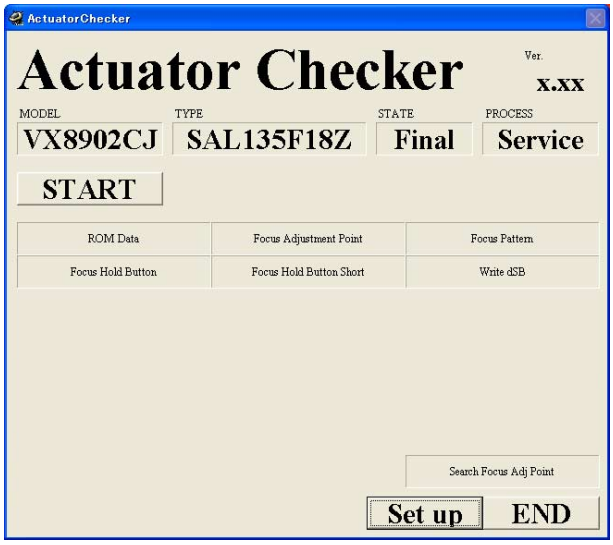


Fig.4-11-1

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.4-11-2

3) The “Select dsb” window appears.
4) Being based on the image point shift amount calculated by “4-5. FOCUS-SHIFT CHECK/ADJUSTMENT (APERTURE)”, select the button.

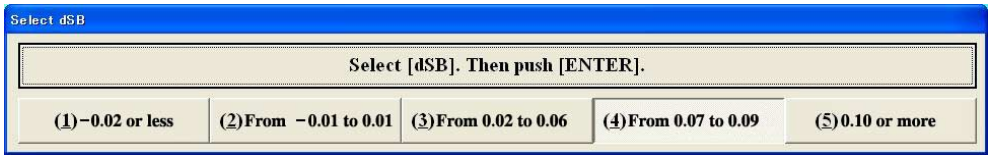


Fig.4-11-3

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

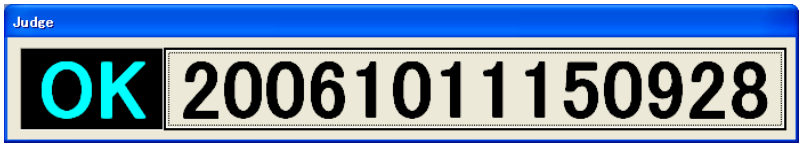


Fig.4-11-4

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.

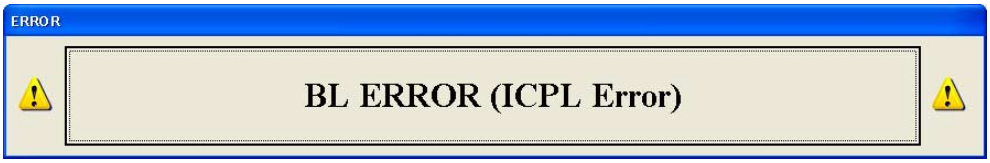


Fig.4-11-5

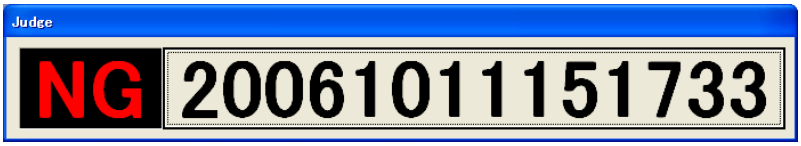


Fig.4-11-6

2) If the “NG” appears again, confirm or perform the following.
   - Replaceing 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.

SAL135F18Z

(Sonnar 1.8/135 ZA) (Sonnar T* 135mm F1.8 ZA)

SONY

SERVICE MANUAL

Ver. 1.4 2007.12

US Model
Canadian Model
AEP Model
Chinese Model

SUPPLEMENT-1

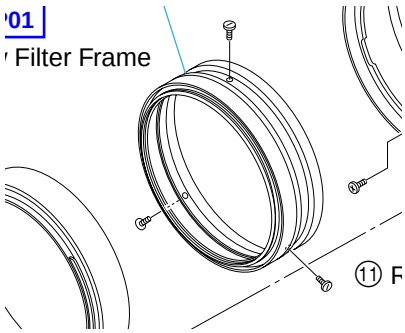
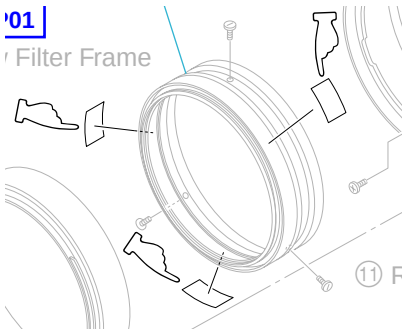
File this supplement with the service manual.

(DI07-209)

- **Addition of Repair Parts**
- **Change of HELP01**

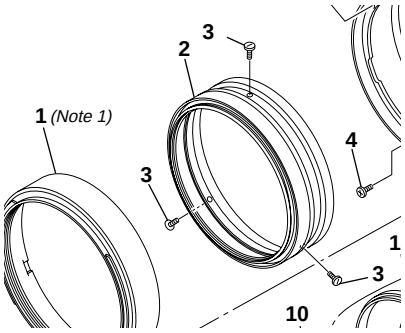
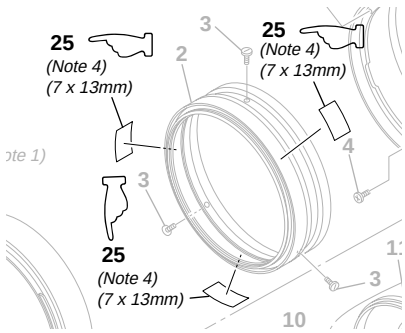
2-1-1. OUTER BARREL BLOCK, MOUNT BLOCK AND LIGHT SHIELD RING BLOCK

☞ : Points added portion.

Page	Before change	After change
2-3		

3-1-1. OUTER BARREL BLOCK, MOUNT BLOCK AND LIGHT SHIELD RING BLOCK

☞ : Points added portion.

Page	Before change	After change
3-1		

Before change

Ref. No.	Part No.	Description
—		

After change

(Note 4) Cut the polyester tape (black) 10mm (per roll) (Ref. No. 25) for specified size.

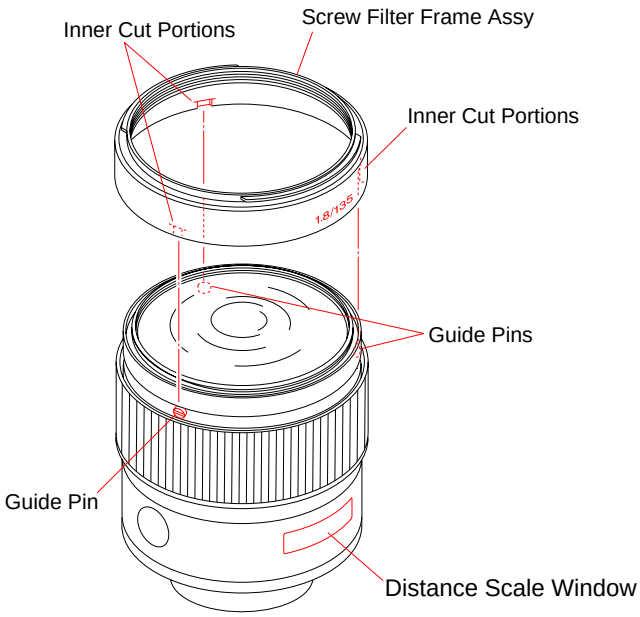
Ref. No.	Part No.	Description
25	9-913-210-03	POLYESTER TAPE (BLACK) 10mm (Note 4)

Published by Kohda TEC

HELP01

Before change

2. Aligning the inner cut portions at three locations with the guide pins, install the screw filter frame assy with the print of [1.8/135] placed at the distance scale window side.

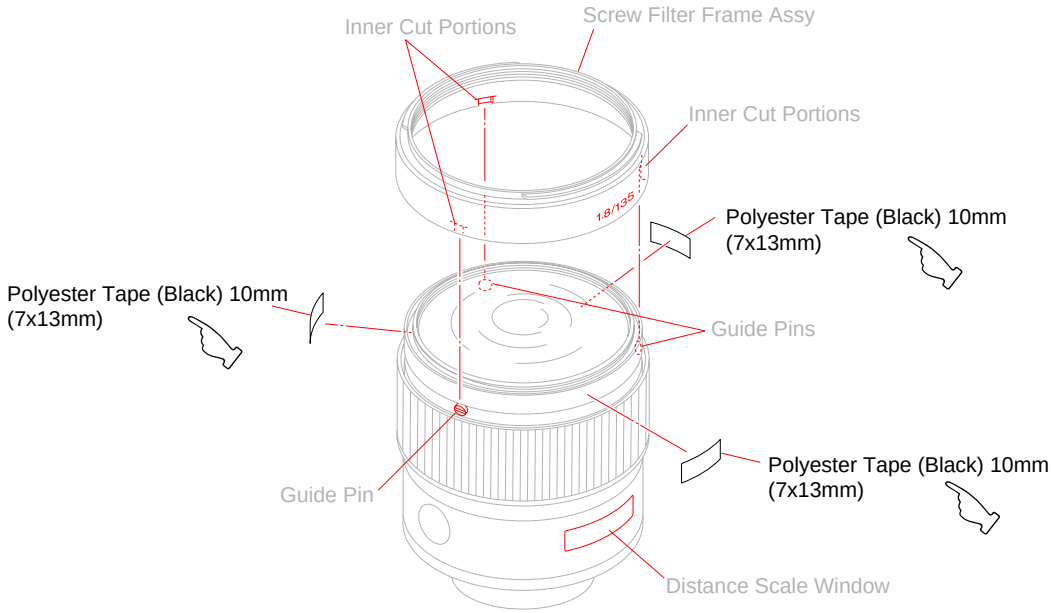


After change

2. Affix the polyester tape (black) 10mm cut as instructed to the location shown in figure.

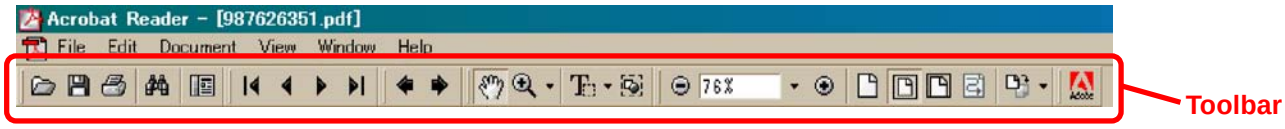
Note: Affix three sheets of polyester tape to three-divided circumferences (Center of each guide pin) of the draw ring assy.

3. Aligning the inner cut portions at three locations with the guide pins, install the screw filter frame assy with the print of [1.8/135] placed at the distance scale window side.



4. Push the filter screw frame removing tool to the draw ring assy and rotate it counterclockwise as far as it goes and stops.

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



Printing a text

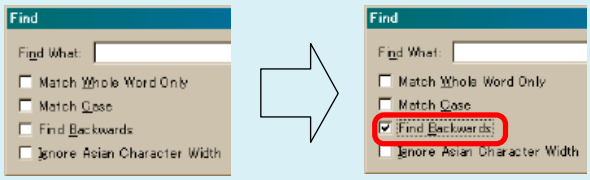
1. Click the Print button .
2. Specify a printer, print range, number of copies, and other options, and then click [OK].

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

Finding a text

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

Application to the Service Manual:
To execute "find" from current page toward the previous pages, select the check box "Find Backward" and then click the "Find".



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

Application to the Service Manual:
The parts on the drawing pages (block diagrams, circuit diagrams, printed circuit boards) and parts list pages in a text can be found using this find function. For example, find a Ref. No. of IC on the block diagram, and click the [Find Again] continuously, so that you can move to the Ref. No. of IC on the circuit diagram or printed circuit board diagram successively.
Note: The find function may not be applied to the Service Manual depending on the date of issue.

Switching a page

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

Reversing the screens displayed once

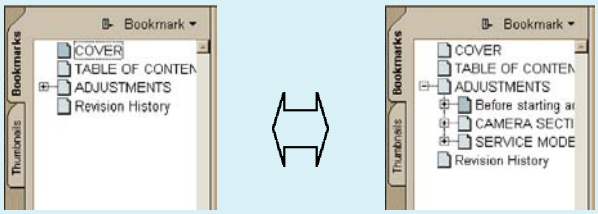
- To reverse the previous screens (operation) one by one, click the .
- To advance the reversed screens (operation) one by one, click the .

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

Moving with link

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

Moving with bookmark:
Click an item (text) on the bookmark pallet. and you can move to the link destination. Also, clicking can display the hidden items.
(To go back to original state, click)



Zooming or rotating the screen display

"Zoom in/out"

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

"Rotate"

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

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

Revision History

Ver.	Date	History	Contents	S.M. Rev. issued
1.0	2006.10	Official Release	—	—
1.1	2006.11	Correction-1 (C1)	• Correction of Parts Number S.M Correction : Cover	Yes
1.2	2007.02	Revised-1	• Addition of Service note • Addition of Disassembly • Addition of Repair parts list • Addition of Adjustments	Yes
1.3	2007.05	Correction-2 (C2)	• Correction of Parts Number S.M Correction : Page 4-1	Yes
1.4	2007.12	Supplement-1 (S1 DI07-209)	• Addition of Repair Parts • Change of HELP01 • Change of HELP (HELP02) • Addition of guide [About the MTF measurement] (Cover, Page 1-2) • Correction of Aperture Diameter Check (Page 4-13, 4-15) • Correction of Formula of Focus-Shift (Page 4-26)	Yes