INC

JAA79351-R.3670.A

作成承認印	配布許可印
ニコン 映像カンパニー 品質保証部 GM	サービス 計画課 M

AF-S DX Nikkor ED 55-200/4-5.6G

JAA79351 Black
JAA79301 Silver

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

Printed in Japan May 2005

Specifications

Type of lens: G-type AF-S DX Zoom-Nikkor lens with built-in CPU and Nikon bayonet mount (Specially designed for use with Nikon digital SLR – Nikon DX format – cameras)

Focal length: 55mm–200mm

Maximum aperture: f/4–5.6

Lens construction: 13 elements in 9 groups (2 ED lens elements)

Picture angle: 28°50'–8°

Focal length scale: 55, 70, 85, 105, 135, 200mm

Distance information: Output to camera body

Zoom control: Manually via separate zoom ring

Focusing: Autofocus using a Silent Wave Motor; manually via separate focus ring

Closest focus distance: 0.95m (3.1 ft.) at all zoom settings

Diaphragm: Fully automatic

Aperture range: f/4 to f/22 (at 55mm), f/5.6 to f/32 (at 200mm)

Exposure measurement: Via full-aperture method

Attachment size: 52mm (P = 0.75mm)

Dimensions: Approx. 68mm dia. x 79mm extension from the camera's lens-mount flange

Weight: Approx. 255g (9 oz)

・Specifications and designs are subject to change without any notice or obligation on the part

Before Disassembly / Assembly / Adjustment ...

Note:

① When disassembling, make sure to memorize the processing state of wires and FPC.

② Because prototypes are used for "Disassembly/(Re)assembly/Adjustment", they may differ from the actual products in forms, etc.

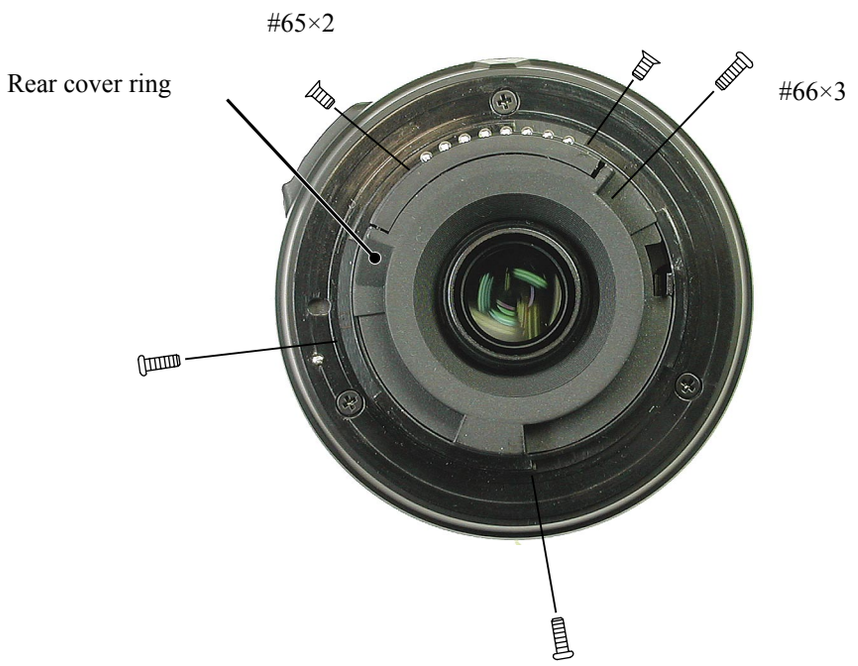
③ Because pictures are processed by a special method, they may differ from the actual ones in texture.

Points to notice for Lead-free solder products
・Lead-free solder is used for this product. ・For soldering work, the special solder and soldering iron are required. ・Do NOT mix up lead-free solder with traditional solder. ・Use the special soldering iron respectively for lead-free solder and lead solder. They cannot be used in common.

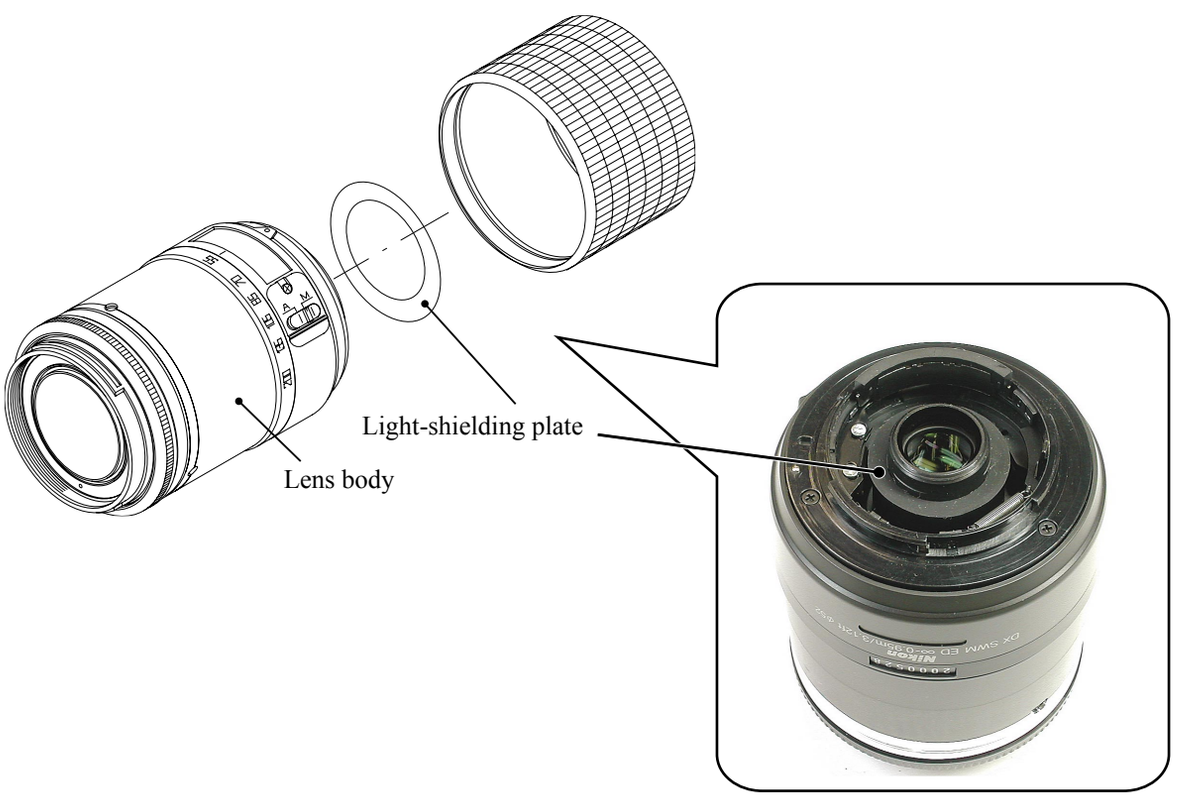
1. Disassembly

Rear cover ring

- Take out 3 screws (#66) of the rear cover ring.
- Take out 2 screws (#65) of AF contact unit.



Light-shielding plate / Rubber ring

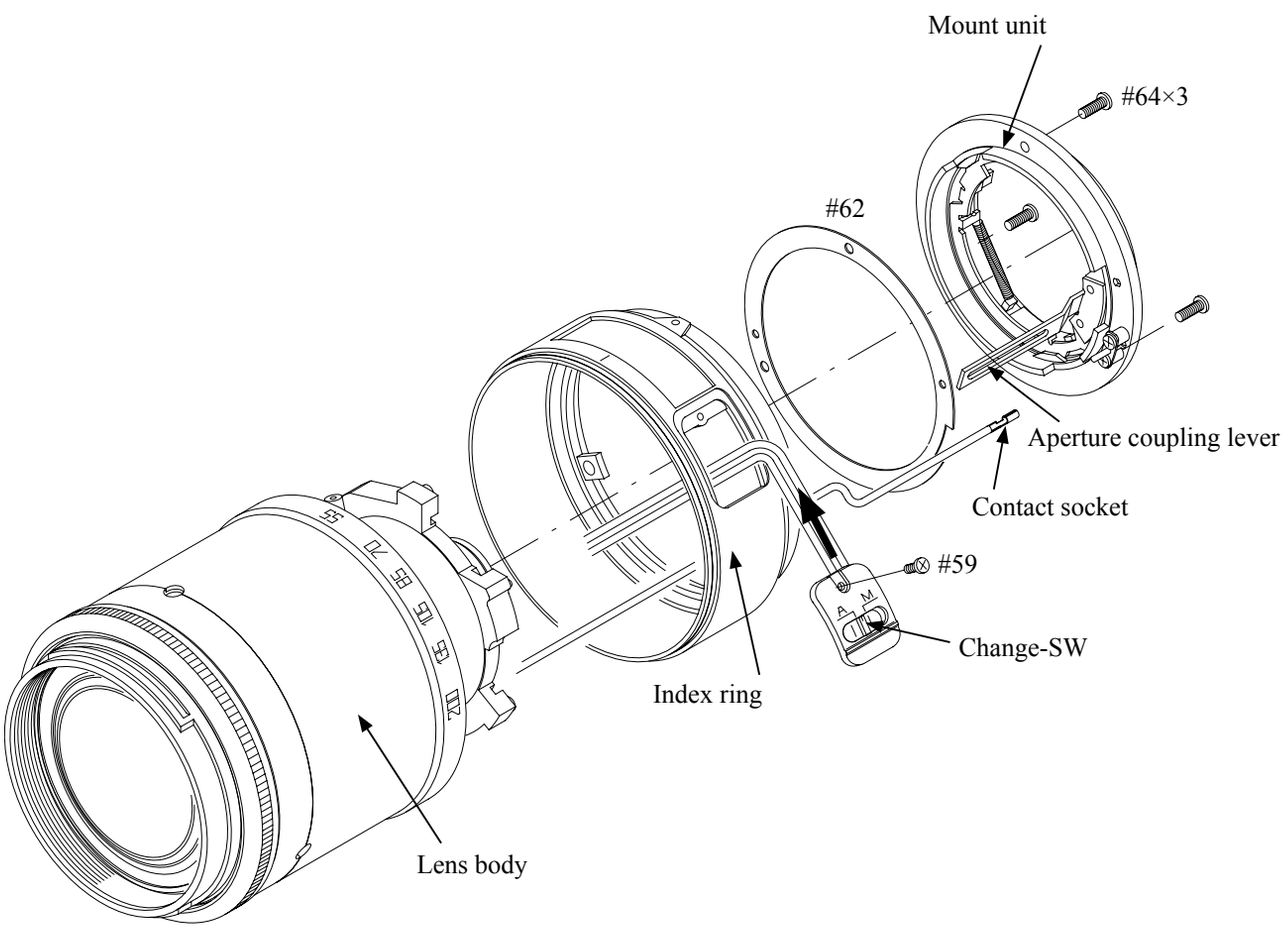


Index ring / Mount unit

- Take out 3 screws (#64).
- Slacken the mount unit a little. Then remove the GND wire (of the main PCB) from the GND terminal (of the mount unit).
- Remove the mount and washer (#62) from the lens body.

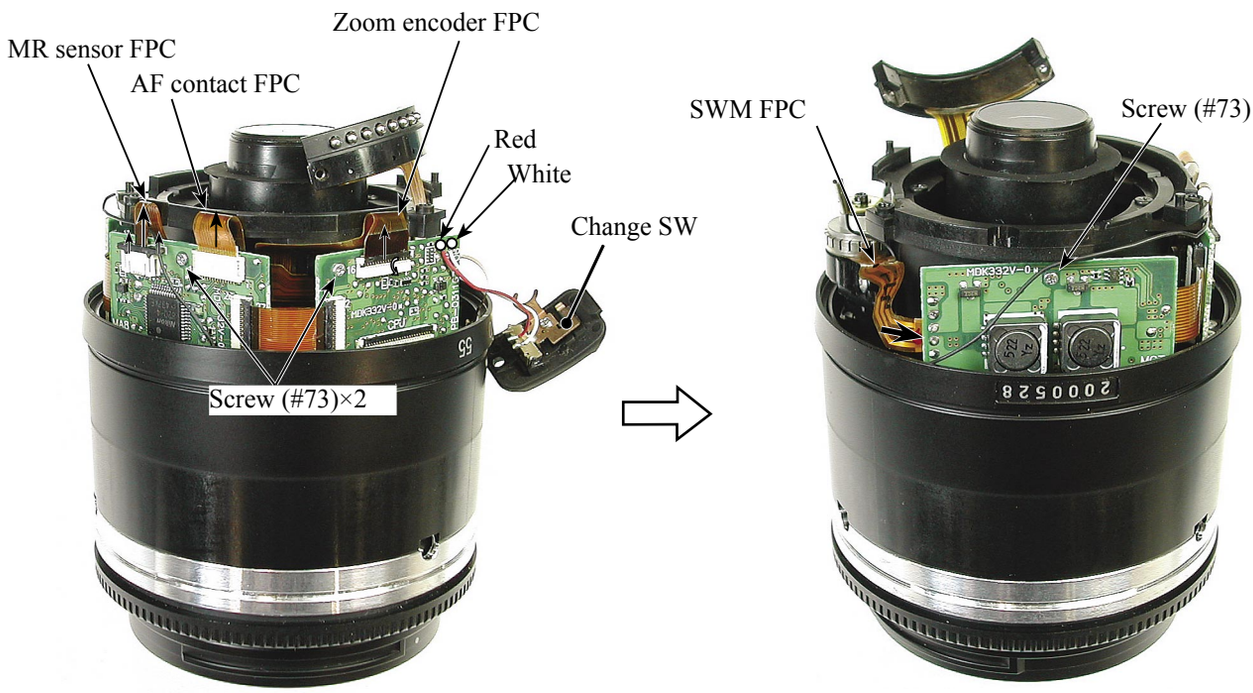
- Set the change-SW to A mode.
- Take out the screw (#59) and the A/M change SW comes off by sliding it slightly in the direction of the arrow.

- Pass the change SW unit through the hole of the index ring, and remove the index ring.



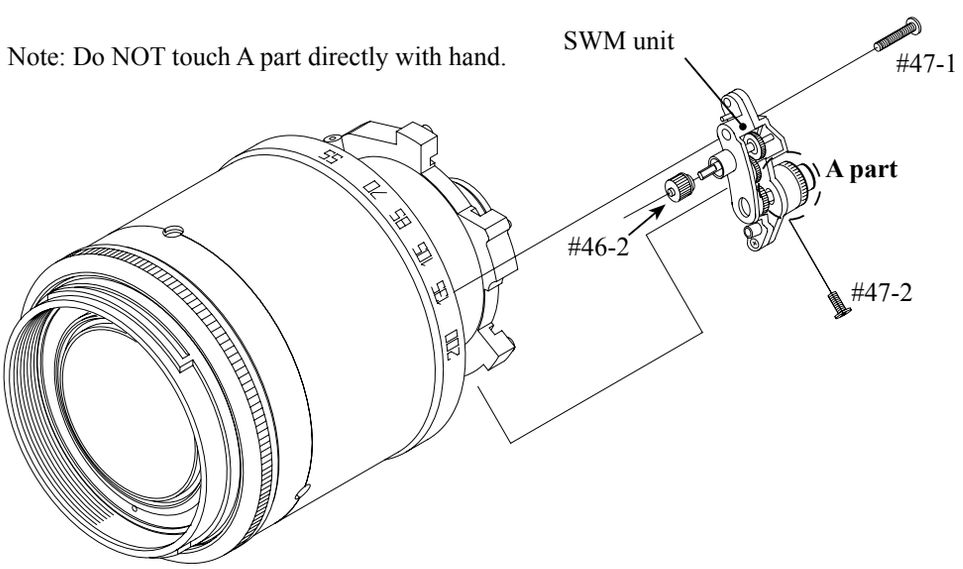
Main PCB

- Remove the FPC of the SWM motor from the connector.
- Disconnect each FPC of the MR sensor, AF contact, and zoom encoder from each connector.
- Take out 3 screws (#73).
- Remove the main PCB from the lens body.



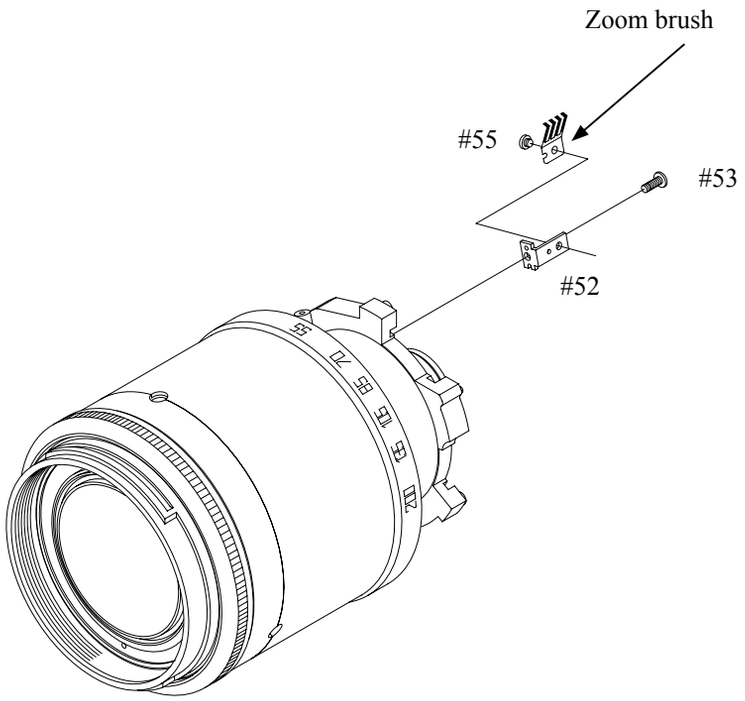
SWM unit

- Take out the screws (#47-1 and #47-2), and remove the SWM unit.



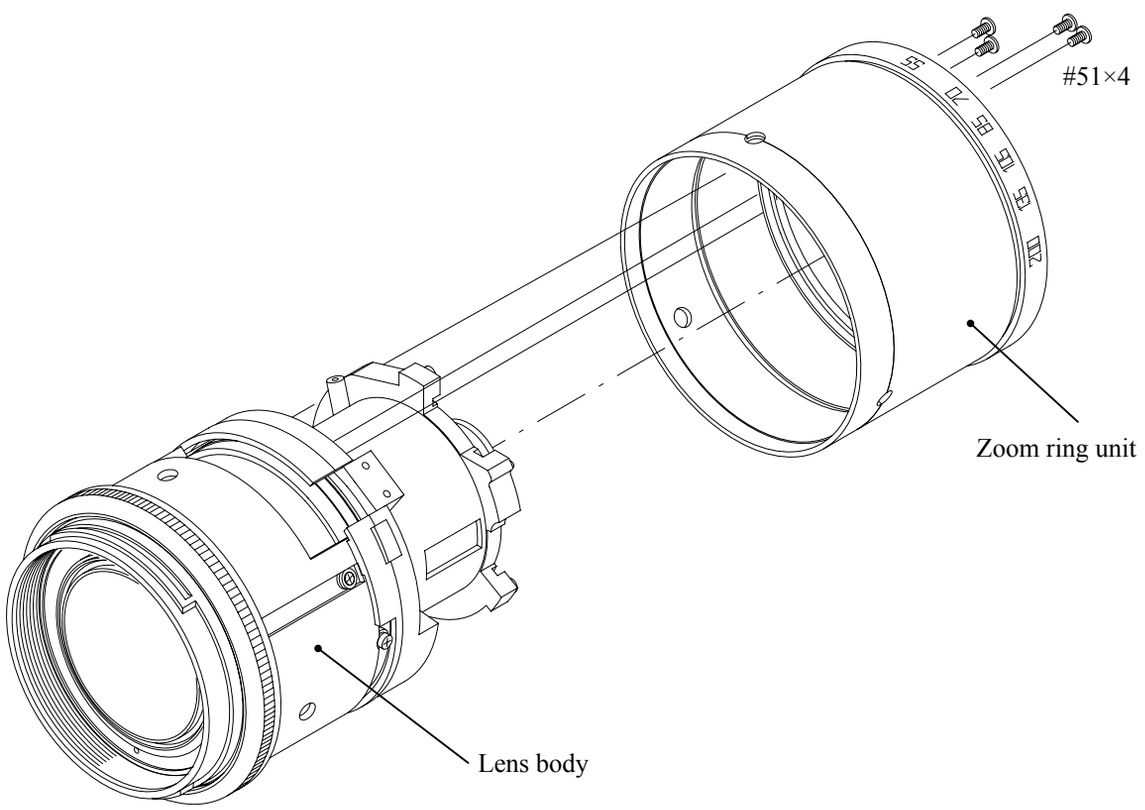
Zoom brush

・ Take out the screw (#53) to remove the zoom brush.



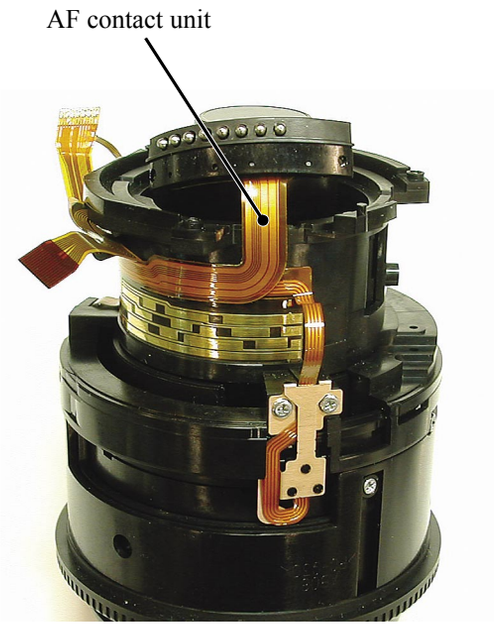
Zoom ring

・ Take out 4 screws (#51) to remove the zoom ring unit.



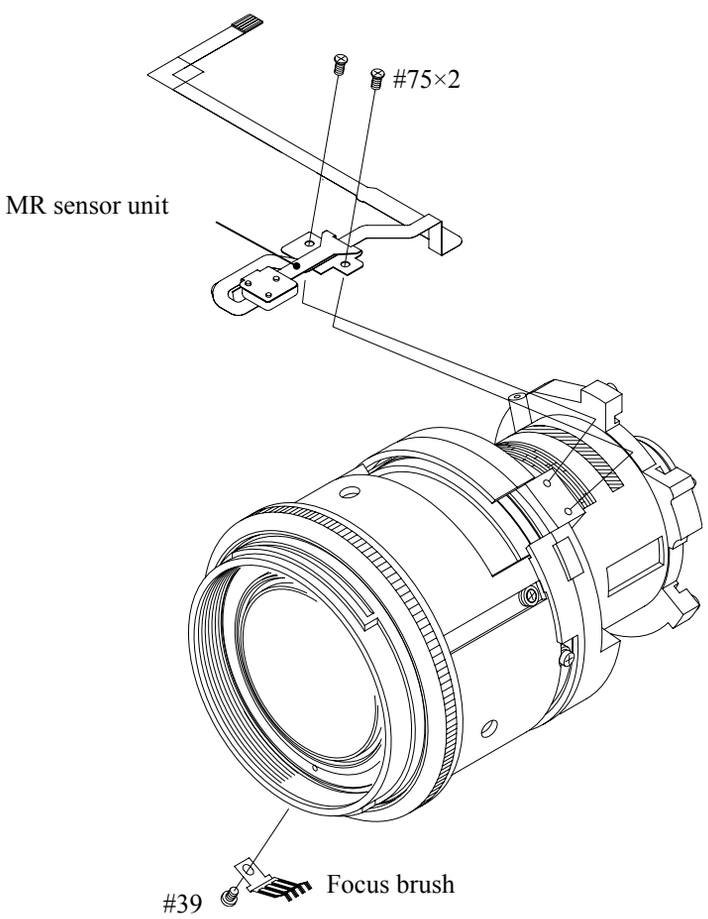
AF contact unit

- Remove the AF contact unit, which is attached with the both-sided adhesive tape.



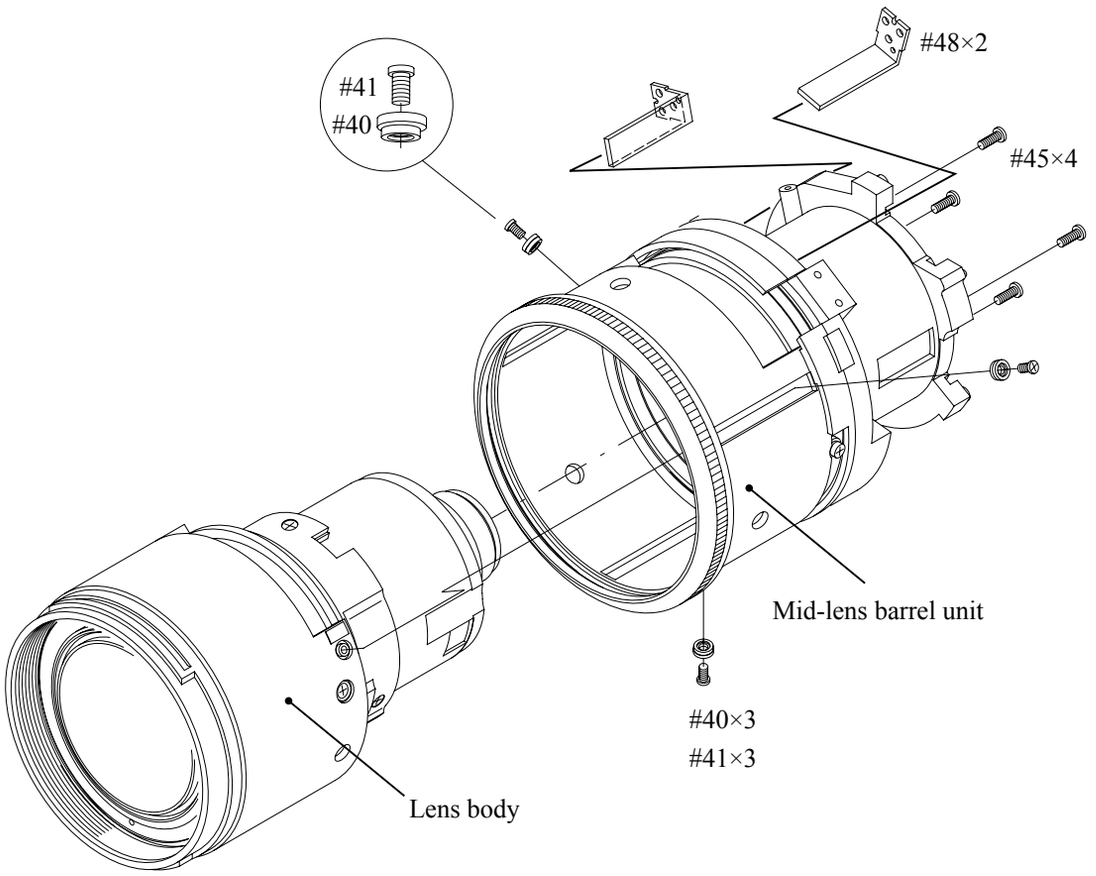
MR sensor unit

- Take out 2 screws (#75) to remove the MR sensor unit.
- Take out the screw (#39) to remove the focus brush.



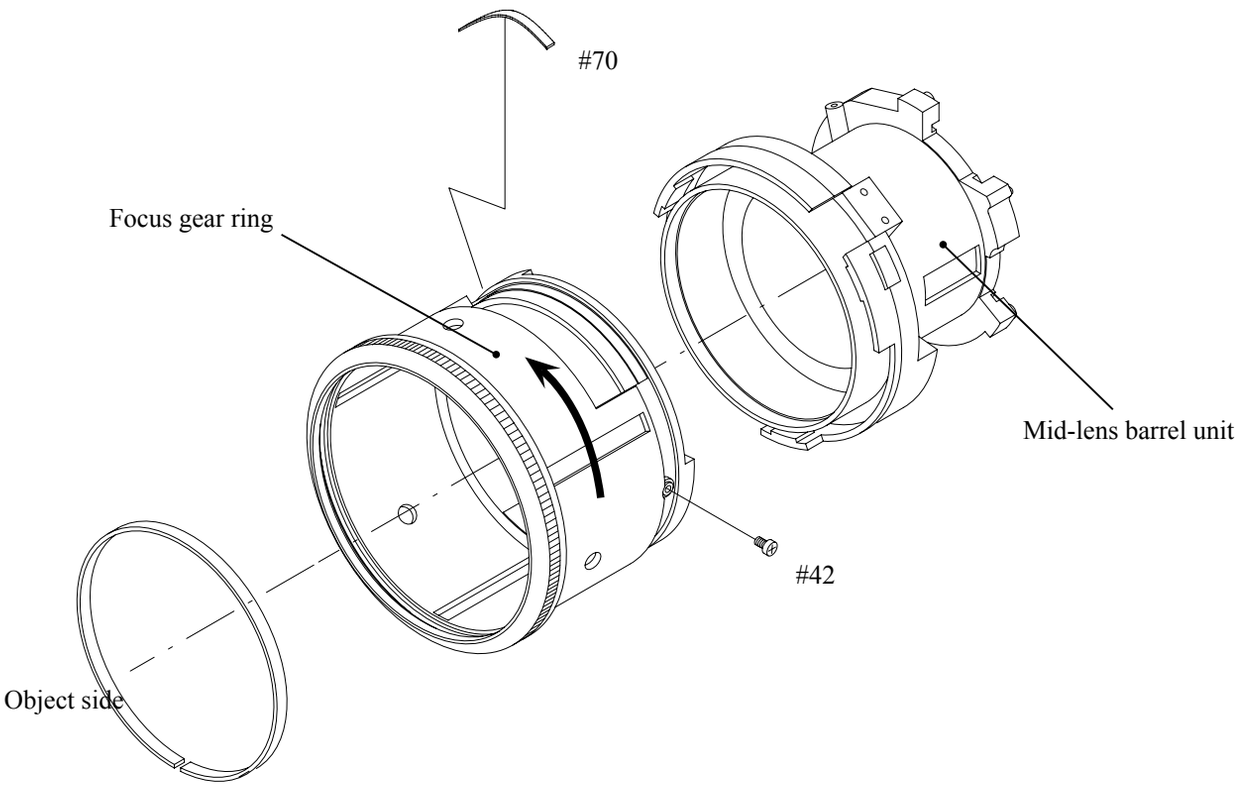
Mid-lens barrel unit

- Take out 3 screws (#41) and 3 collars (#40).
- Take out 4 screws (#45) to remove the mid-lens barrel unit from the lens body.
- 2 keys (#48) come off at the same time.



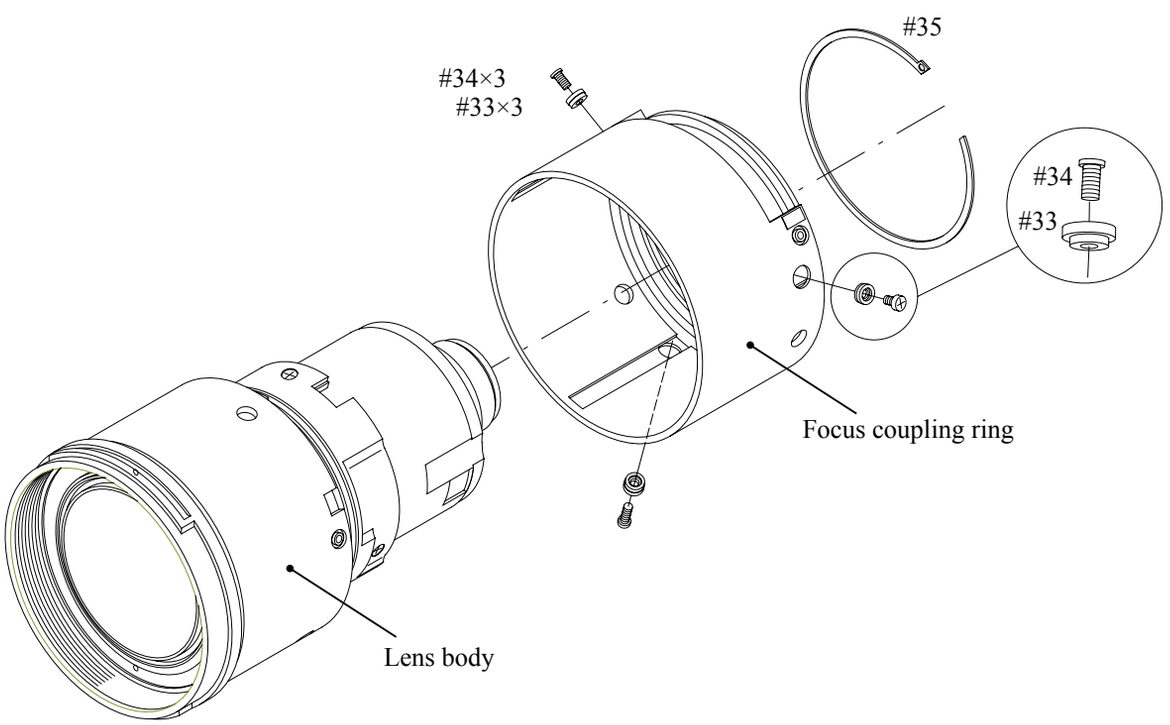
Focus gear ring unit

- Remove the stopper screw (#42).
- Viewed from the object, turn the focus gear ring counterclockwise a little to remove it.
- The friction spring (#70) comes off.



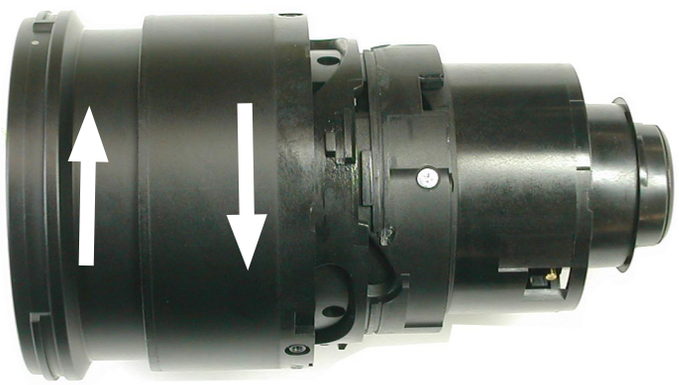
Focus coupling ring

- Take out 3 screws (#34) and 3 collars (#33).
- Remove the stopper ring (#35) to detach the focus coupling ring.



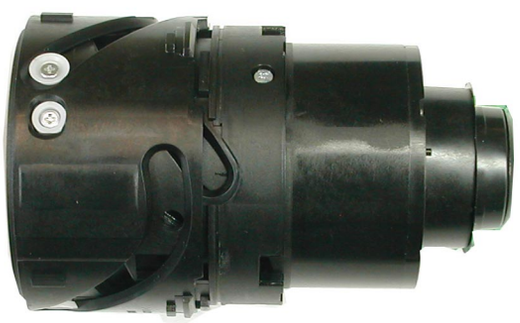
1st lens group

・ Turning the 1st lens-group sliding ring and focus ring each in the direction of the arrow, and remove them from the lens body.



1st lens-group sliding ring

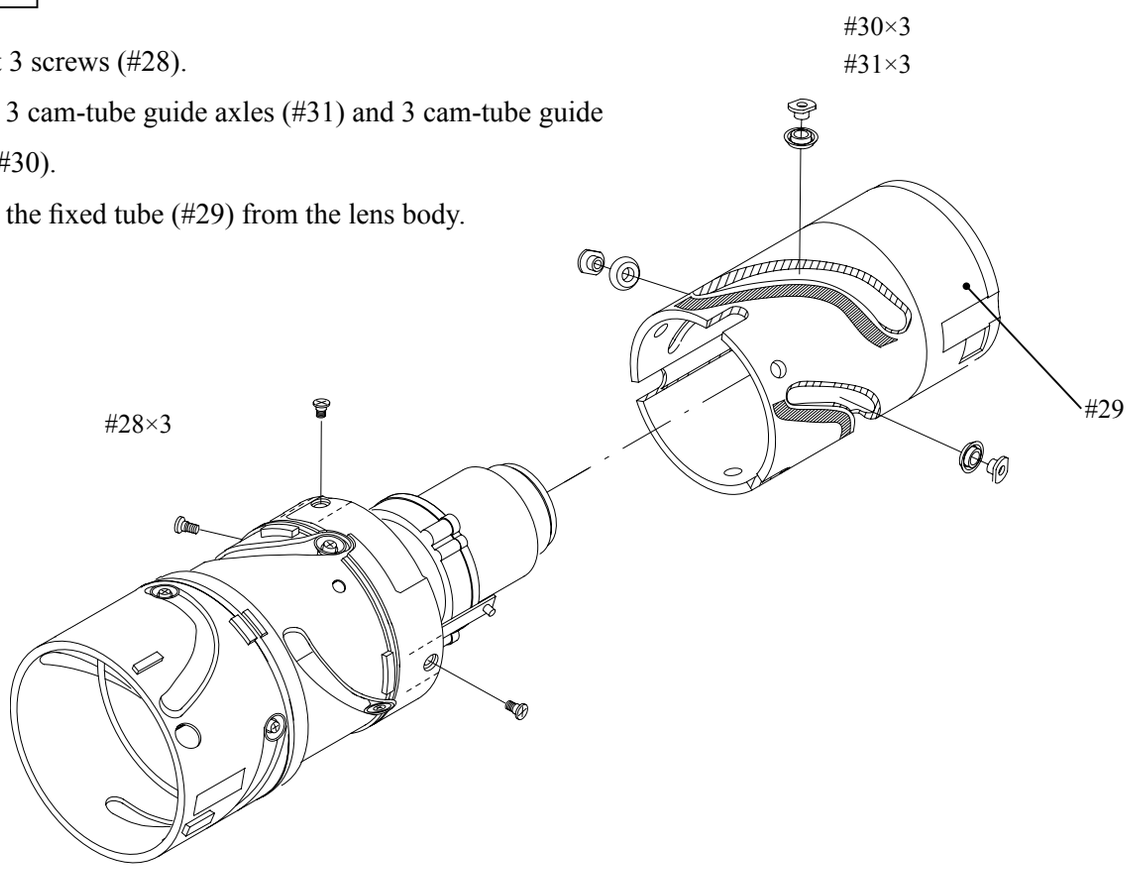
Focus ring



Lens body

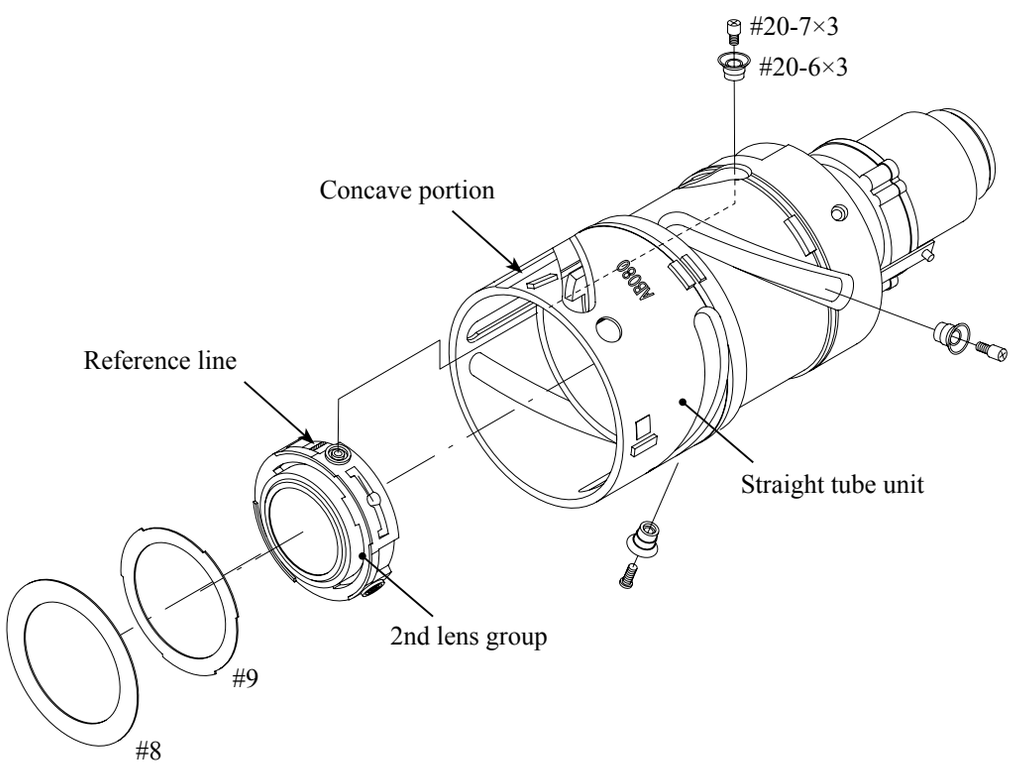
Fixed tube

- Take out 3 screws (#28).
- Remove 3 cam-tube guide axles (#31) and 3 cam-tube guide collars (#30).
- Remove the fixed tube (#29) from the lens body.



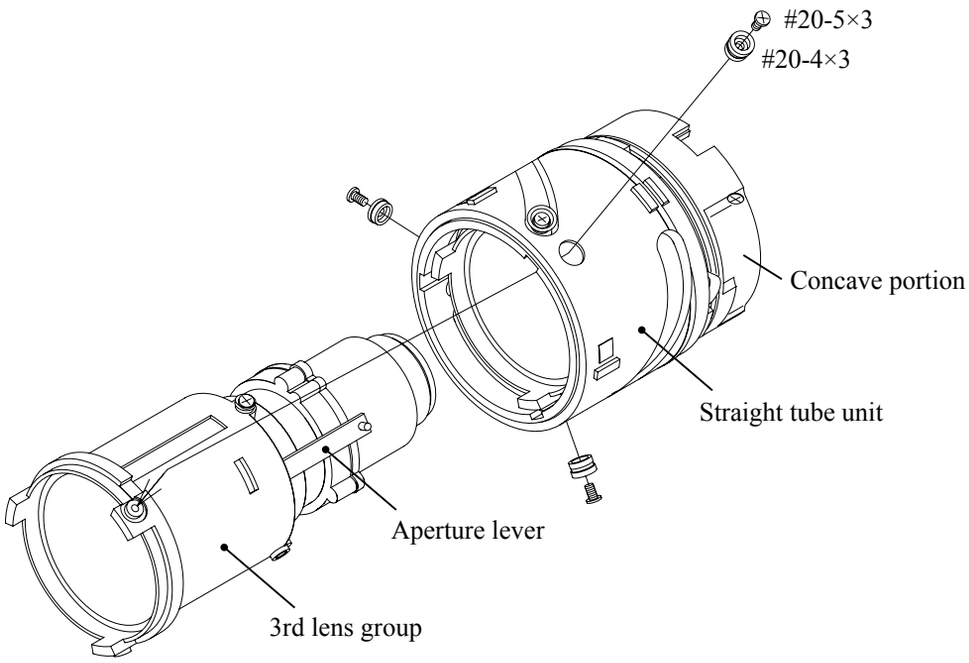
2nd lens group

- Peel off the sheet (#8).
- Remove 3 2nd lens-group collars (#20-6) and 3 screws (#20-7).
- Remove the 2nd lens unit.



Straight tube unit

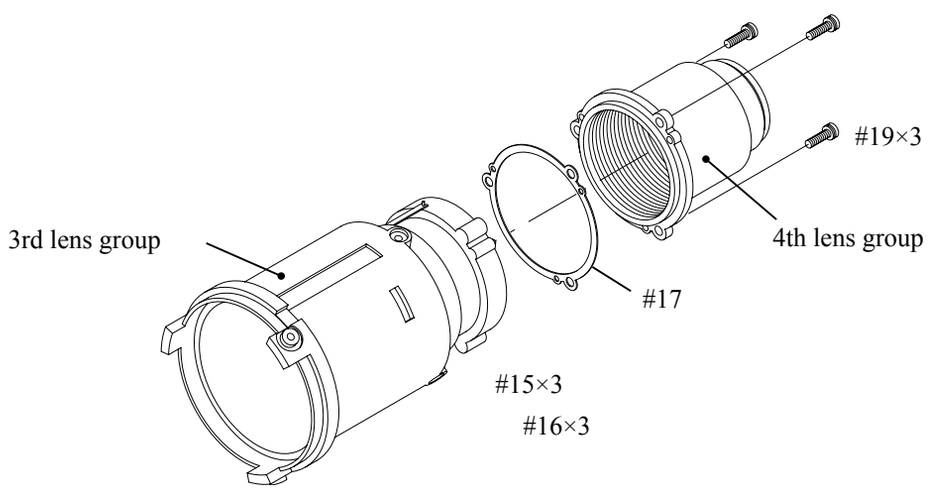
- Remove 3 3rd lens-group collars (#20-4) and 3 screws (#20-5).
- The 3rd lens group and straight tube unit come off.



Removal of 3rd lens group and 4th lens group

- Take out 3 screws (#19).
- #17 and 4th lens group come off.

- The washer and spring-washer are assembled in the screw (#19).

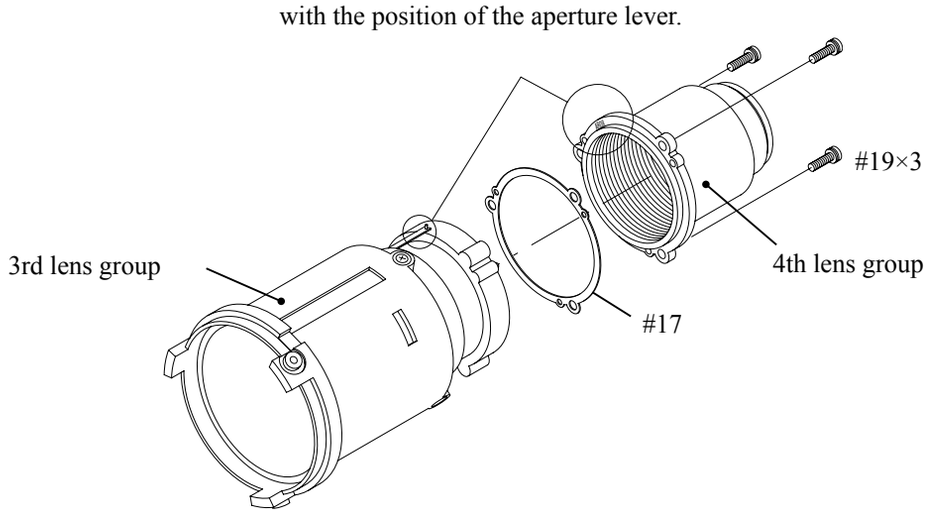


2. Assembly / Adjustment

Mounting of 4th lens group on 3rd lens group

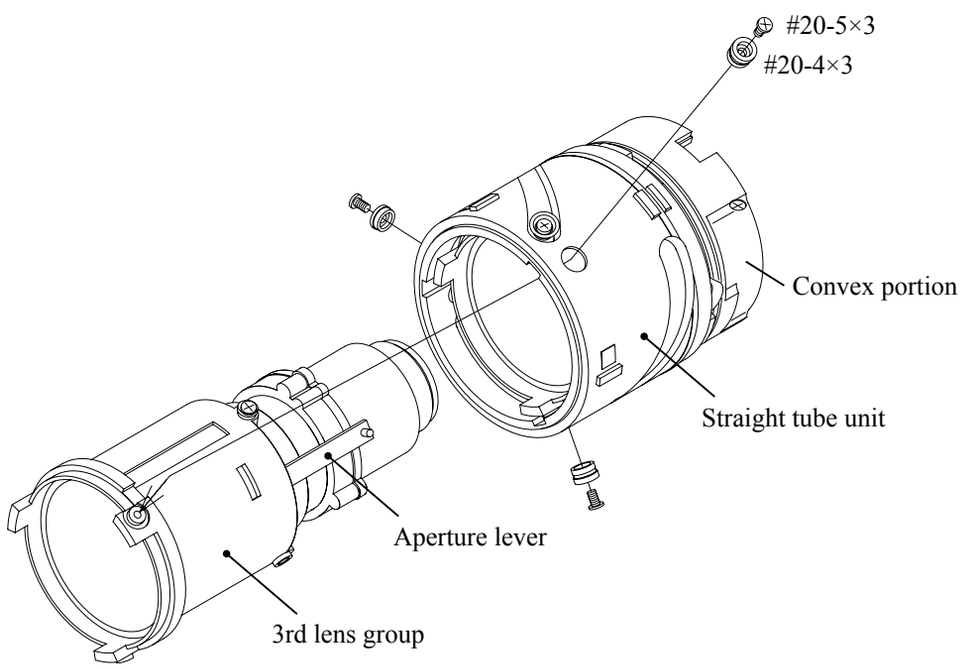
Align the letter of the 4th lens group
with the position of the aperture lever.

・ The washer and spring-washer are assembled in the screw (#19).



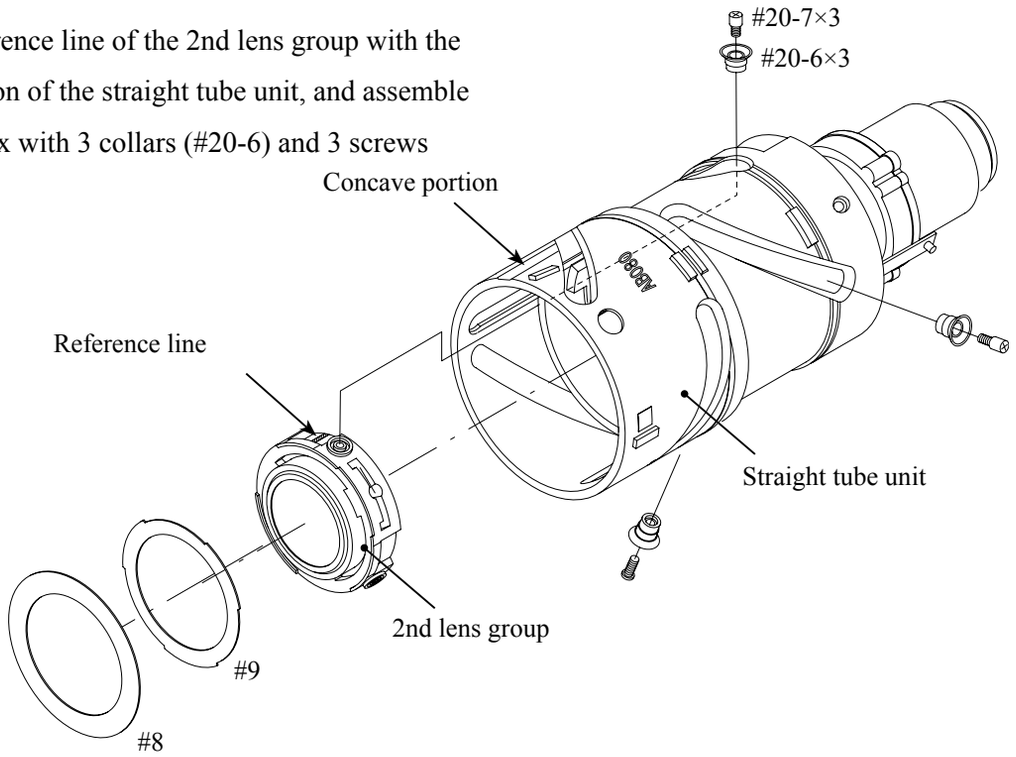
Straight tube unit

・ Align the concave portion of the straight tube unit with the position of the aperture lever of the 3rd lens group, and assemble them. Then attach 3 3rd lens-group collars (#20-4) with 3 screws (#20-5).



2nd lens group

・ Align the reference line of the 2nd lens group with the concave portion of the straight tube unit, and assemble them. Then fix with 3 collars (#20-6) and 3 screws (#20-7).

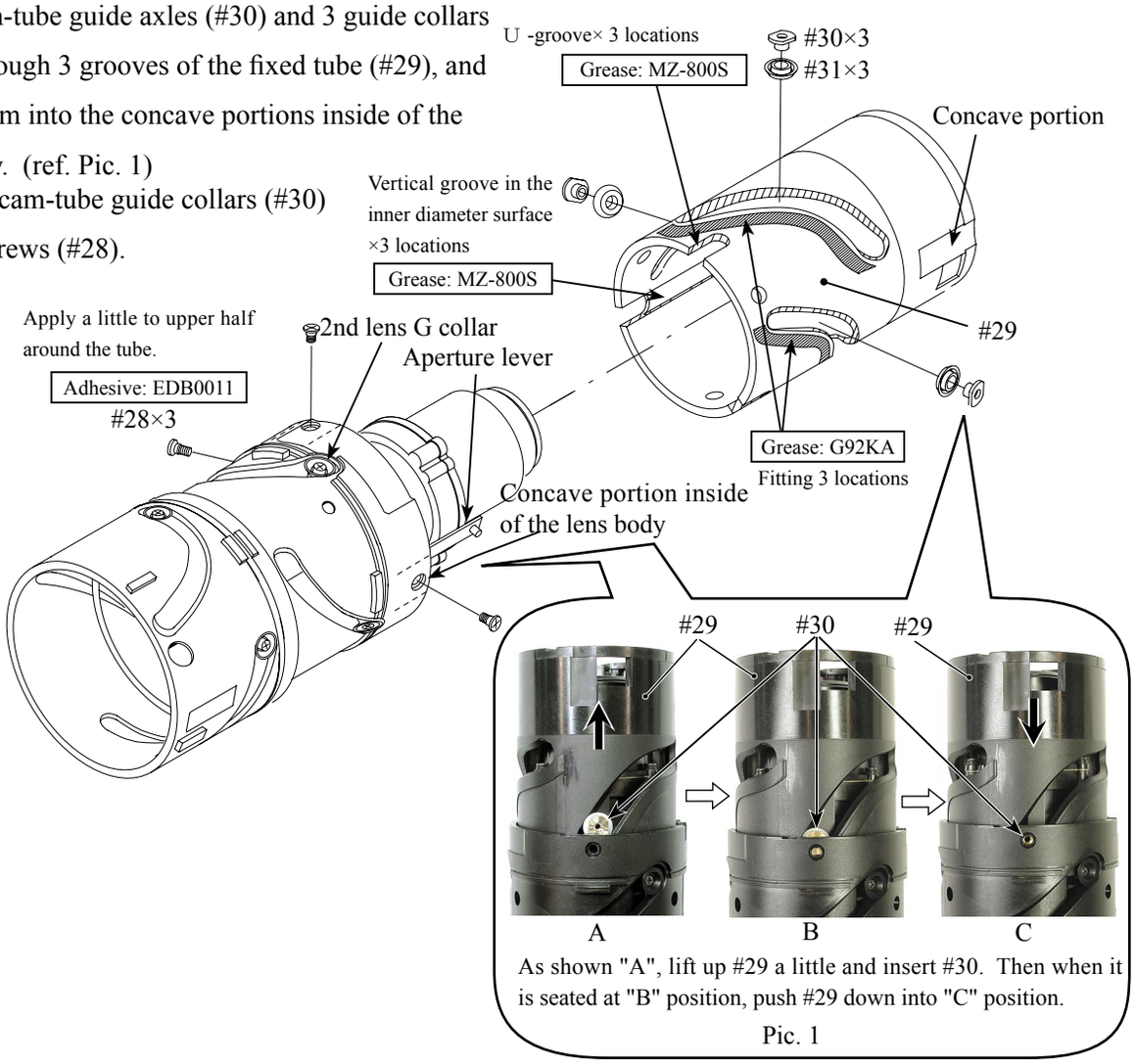


Fixed tube

① Align the concave portion of the fixed tube (#29) with the position of the aperture lever of the lens body. Then assemble them so that 2nd lens G collars enter into the 3 U-grooves.

② Put 3 cam-tube guide axles (#30) and 3 guide collars (#31) through 3 grooves of the fixed tube (#29), and insert them into the concave portions inside of the lens body. (ref. Pic. 1)

③ Fix the 3 cam-tube guide collars (#30) with 3 screws (#28).



As shown "A", lift up #29 a little and insert #30. Then when it is seated at "B" position, push #29 down into "C" position.

Pic. 1

1st lens group

★ : Newly prepared as RJ

① Put the 1st lens-G adjusting washer (#3) and the 1st lens-group into the 1st lens-G sliding ring.

② Attach 3 1st lens-G collars (#6) and 3 screws (#7) to the 1st lens-G sliding ring.

③ Set the straight tube of the lens body to WIDE side.

④ Viewed from the 1st lens group side, place the “PC-30” letters of the focus ring at the position of 10 o'clock, by counting the index position of the 1st lens-G sliding ring as 12 o'clock.

⑤ Put the focus ring and 1st lens-G sliding ring in the place of Fig.1. Then align the convex portion of the lens body with the concave portion of the focus ring to assemble them.

⑥ Turn the lens body, which was assembled in ⑤ in the direction of the arrow until its convex portion enters in the inner groove of the 1st lens-G sliding ring. Then push the lens body and focus ring all the way into the 1st lens-G sliding ring.

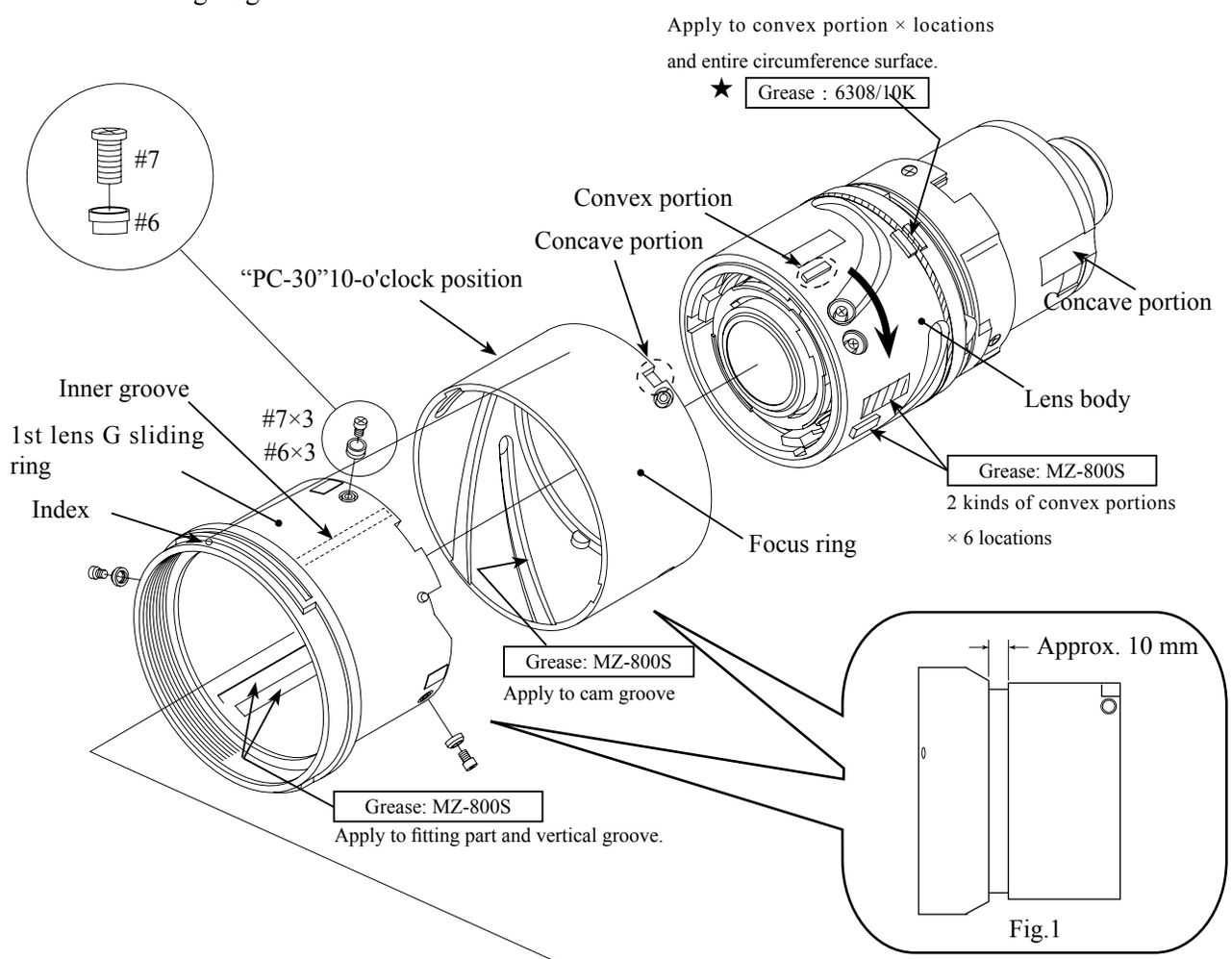
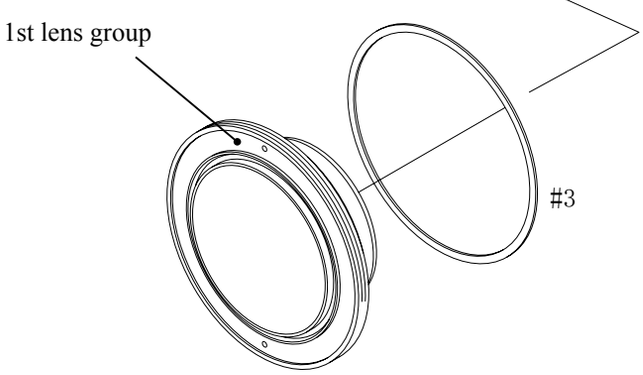


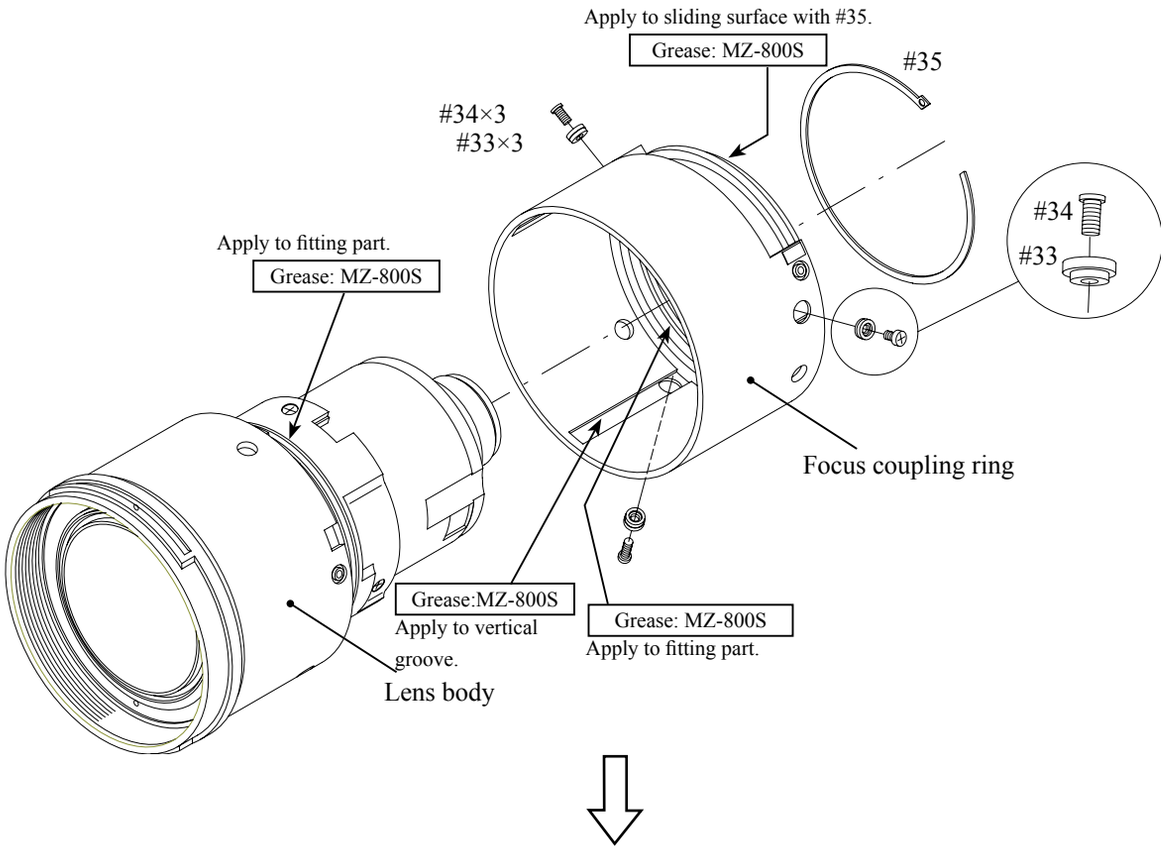
Fig.1



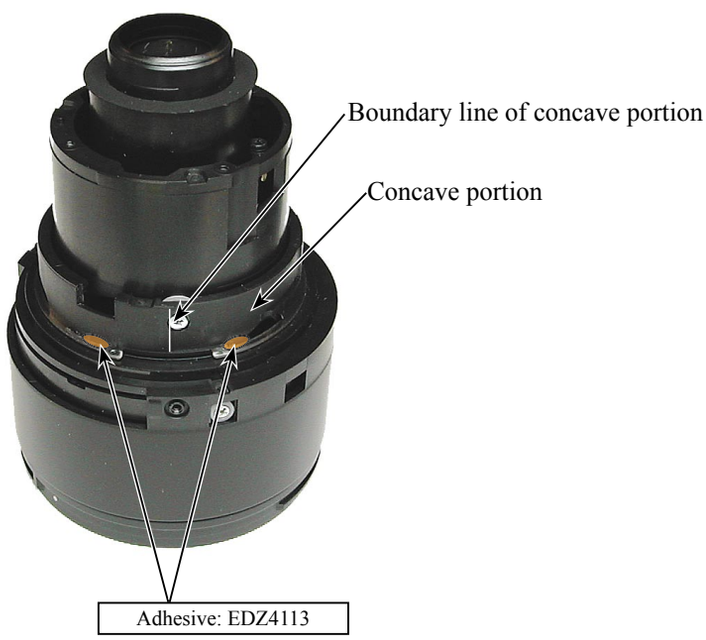
Focus coupling ring

Note:

Do NOT pull out the 1st lens group from the lens body while assmbling to keep it from becoming detached from the grooves, etc of the lens body.



・ Fix the focus coupling ring retainer (#35) at the below position, and apply the adhesive (EDZ4113) at 2 locations of the below.



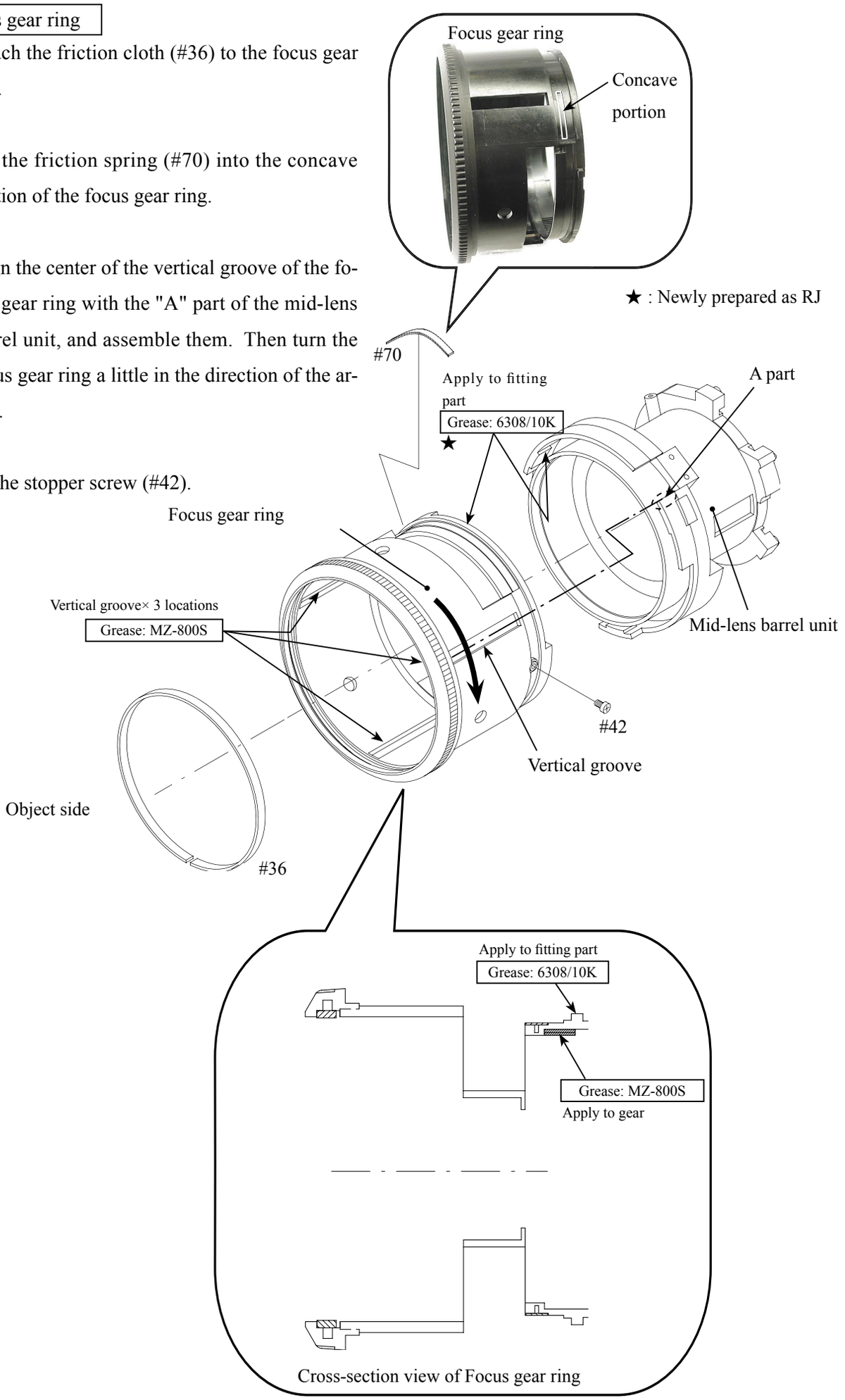
Focus gear ring

① Attach the friction cloth (#36) to the focus gear ring.

② Put the friction spring (#70) into the concave portion of the focus gear ring.

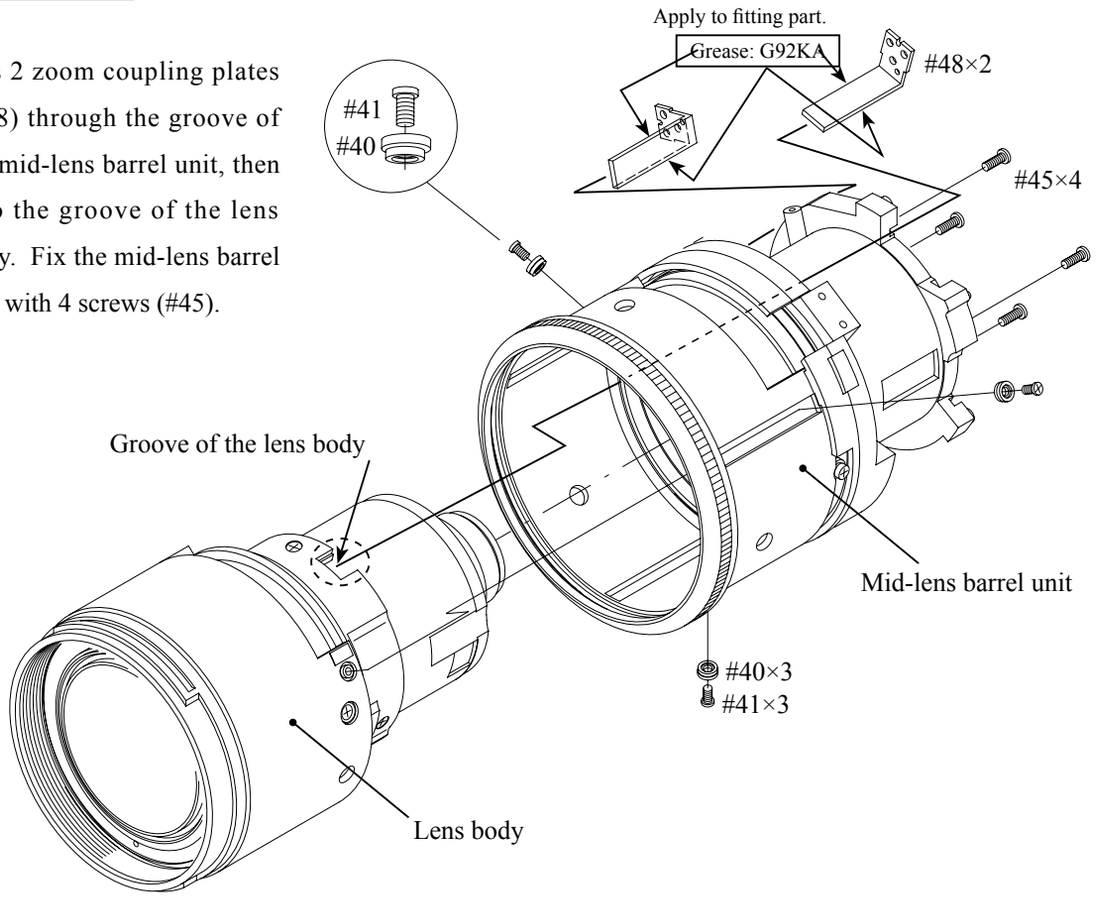
③ Align the center of the vertical groove of the focus gear ring with the "A" part of the mid-lens barrel unit, and assemble them. Then turn the focus gear ring a little in the direction of the arrow.

④ Fix the stopper screw (#42).

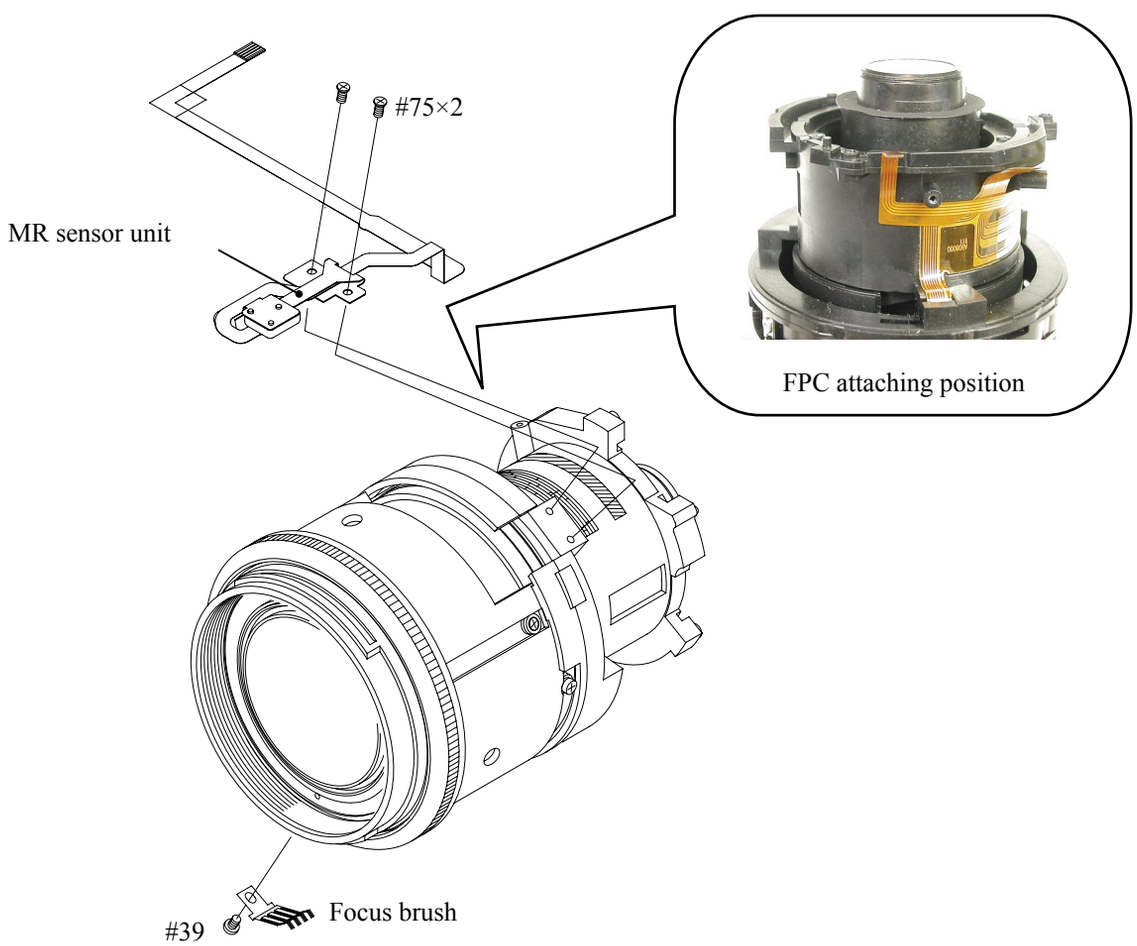


Mid-lens barrel unit

Note) Pass 2 zoom coupling plates (#48) through the groove of the mid-lens barrel unit, then into the groove of the lens body. Fix the mid-lens barrel unit with 4 screws (#45).

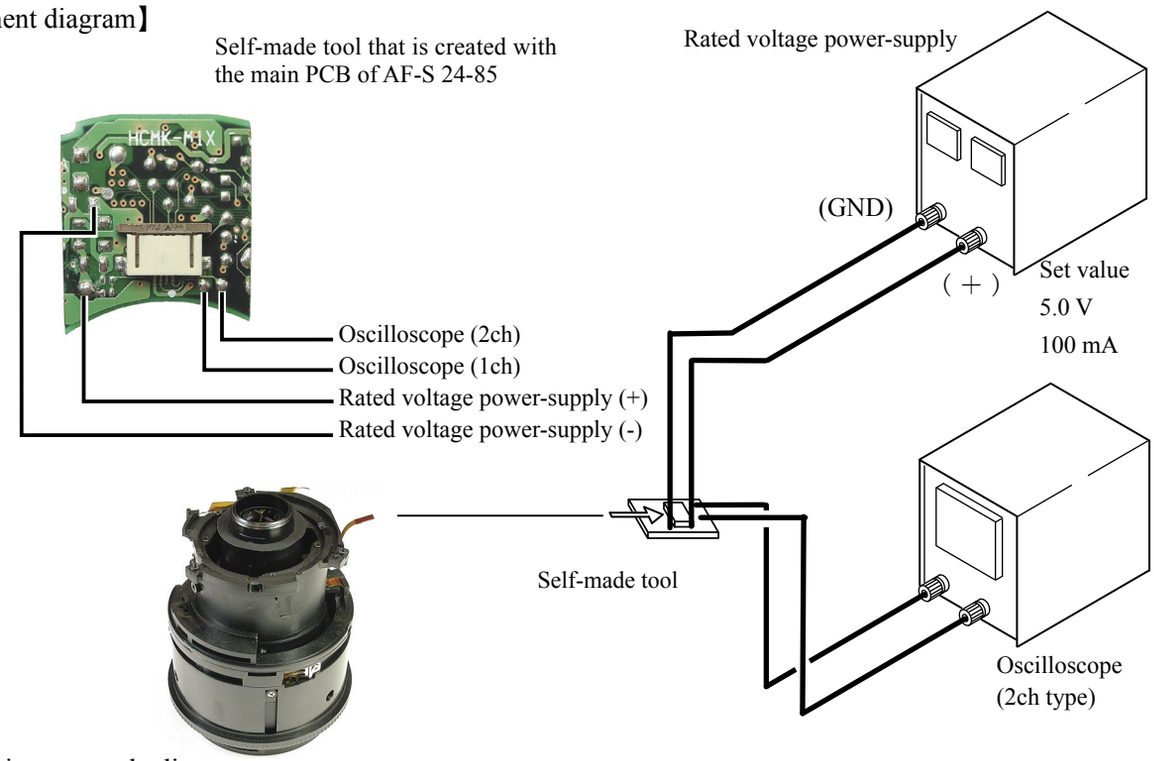


MR sensor unit / Focus brush



Inspection and adjustment of MR encoder output waveform

・【Attachment diagram】



・How to inspect and adjust:

① Confirm that the electric current and voltage of the connected rated voltage power-supply are set values, then turn it ON.

② Set the oscilloscope, and turn the focus ring manually.

Note: The waveform varies according to the rotational speed of the focus ring. So change "Time/Div" setting accordingly.

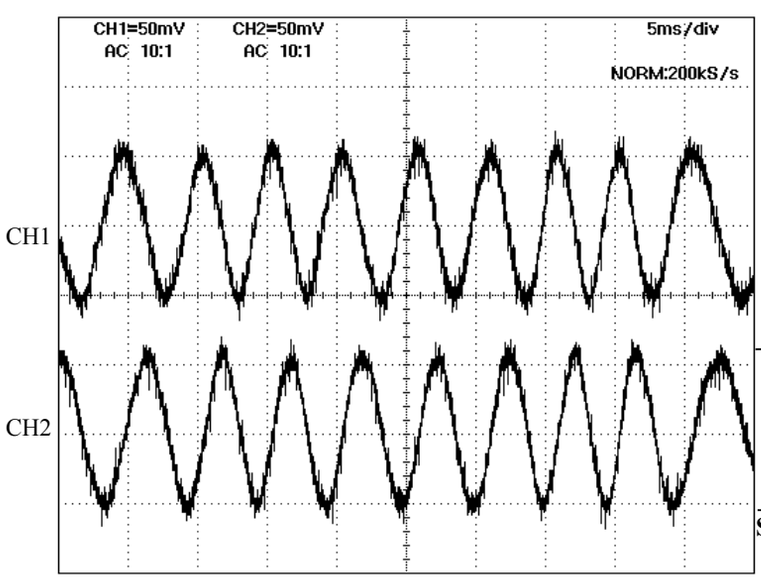


Fig.1

● Oscilloscope setting

V/Div (ch1)	: 50 mV
V/Div (ch2)	: 50 mV
Coupling	: AC
Time/Div	: 5 m Sec
Trigger Mode	: NORMAL
Trigger Coupling	: AC

Standard: Amplitude of all pulses/ waveforms is 70mV or more.

Note: Check the waveform by moving the focus ring back and forth from the infinity-end to the close-end positions entirely.

③ In case large waveform-noise (as shown in Fig. 1) is detected, use the FILTER function.
How to set FILTER function (e.g. DL1540 manufactured by YOKOGAWA)
1. Press the FILTER button.
2. Select "Smooth" of the menu on screen and turn it ON.

⑥ In case the amplitude is small, check if there is deformation in the MR head. If there is, correct the deform of the MR head. However, if such correction is impossible or no deformation is detected, replace the MR sensor unit. (Fig.2)

Note: When adjustments are made, prevent the magnetic surface and MR head from touching the magnetized driver bit. Otherwise, the magnetic data may be damaged.

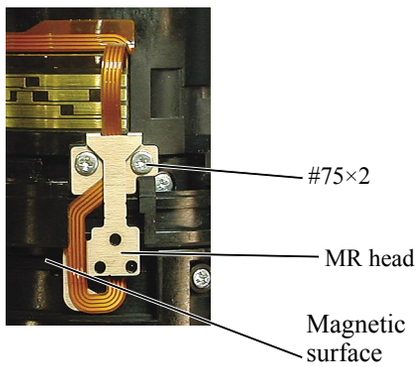


Fig.2

＜ Ref. ＞

● As shown in Fig. 3, if the amplitude of only either CH1 or CH2 is small, one of the 2 screws (#75) may be loosened, so check for it. If this is not the case, the MR head may malfunction, so replace the MR sensor unit and make a readjustment.

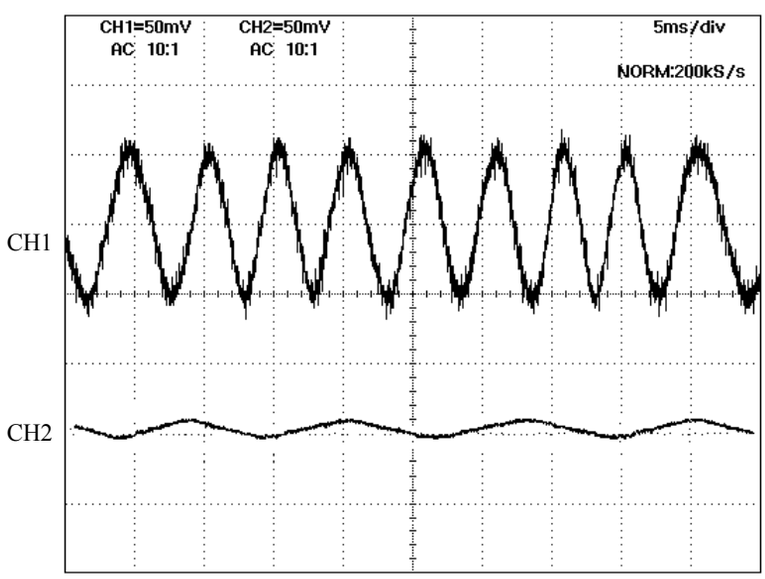
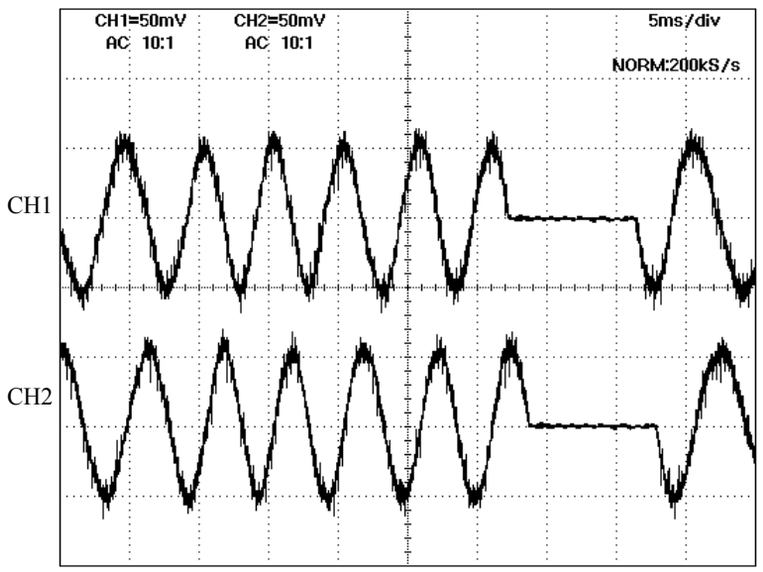


Fig. 3

● As shown in Fig. 4, if the amplitude partially drops between the infinity and the close-distance, the magnetic data of the tape may be damaged. So replace the focus gear ring unit and make a readjustment. Replacing only the magnetic surface is impossible.



Focus gear ring unit

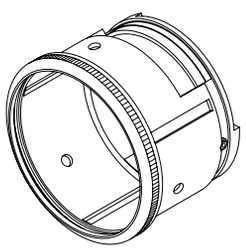


Fig.4

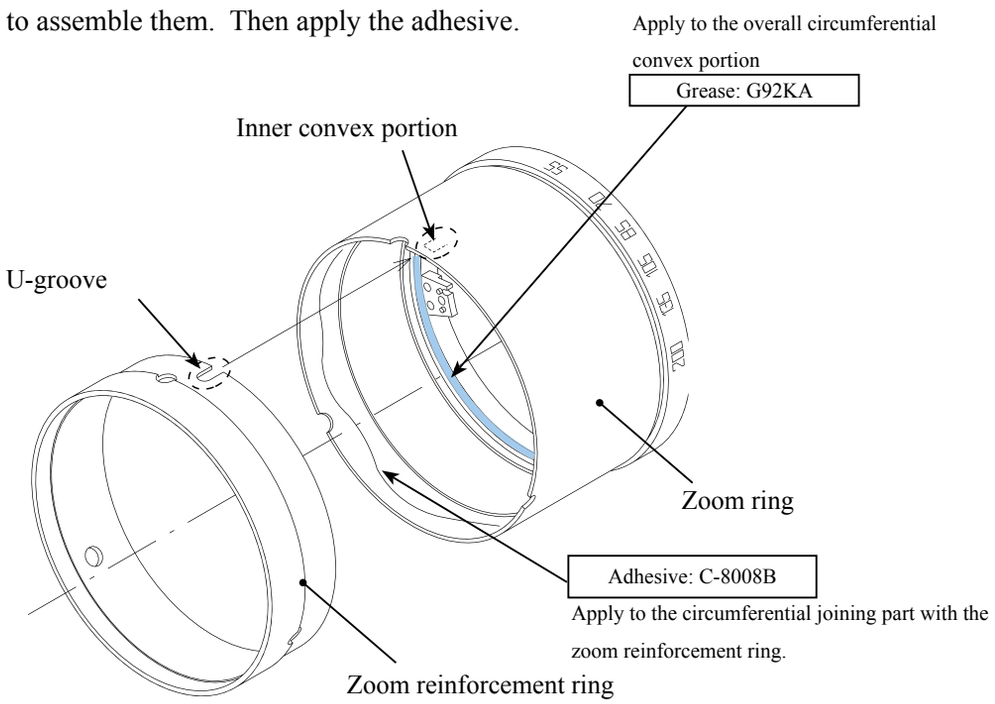
⑤ Turn off the rated voltage power-supply.

AF contact unit

・By using the both-sided adhesive tape of the AF contact unit, attach the AF contact unit to the lens body.

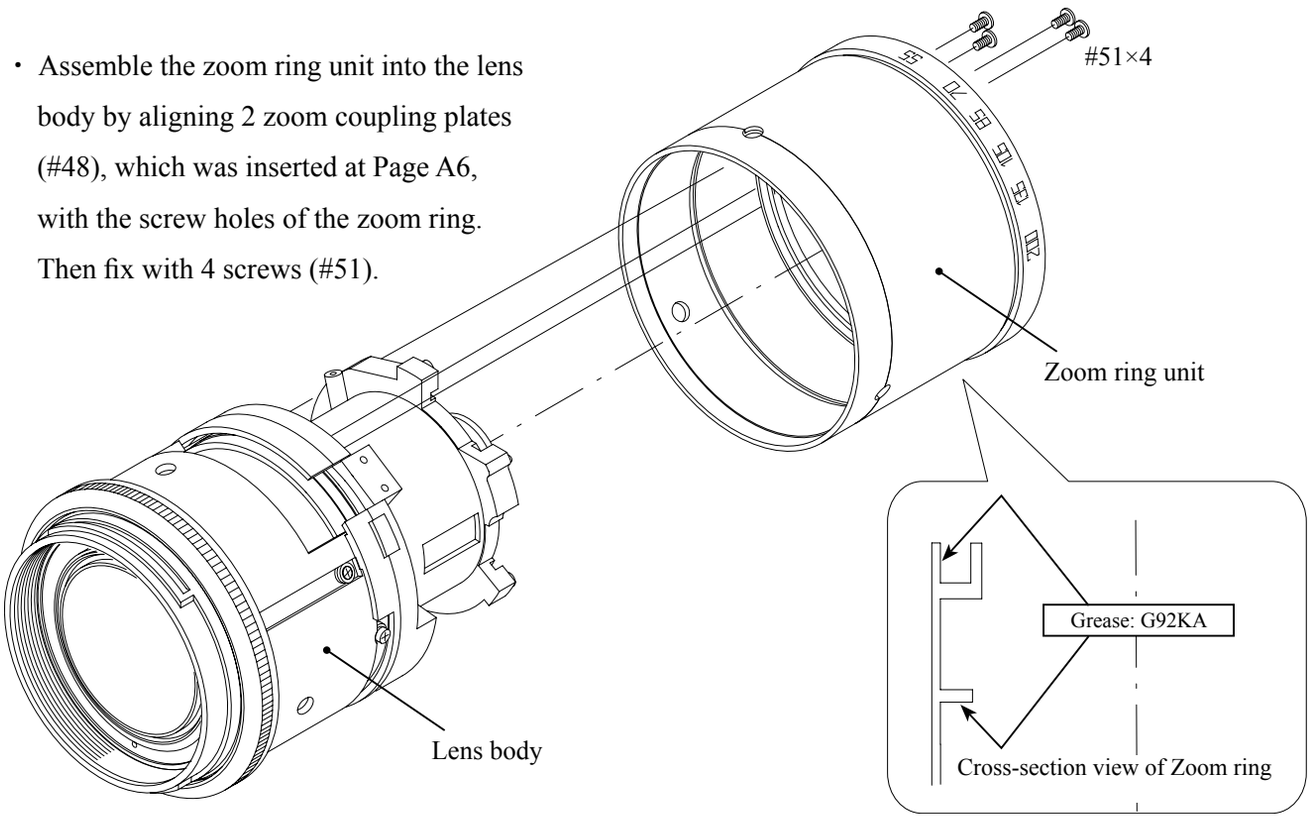
Adhesion of Zoom ring and Zoom reinforcement ring

・Enter the inner convex portion of the zoom ring into the U-groove of the zoom reinforcement ring to assemble them. Then apply the adhesive.

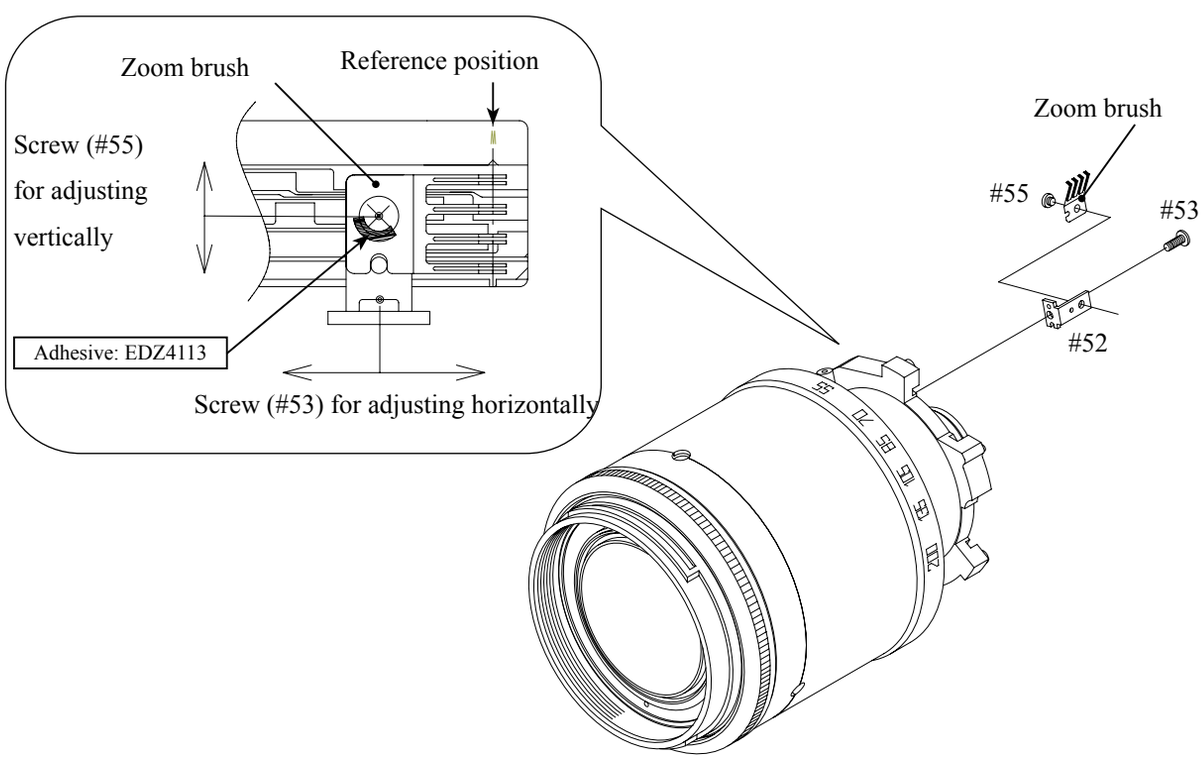


Zoom ring unit

・ Assemble the zoom ring unit into the lens body by aligning 2 zoom coupling plates (#48), which was inserted at Page A6, with the screw holes of the zoom ring. Then fix with 4 screws (#51).

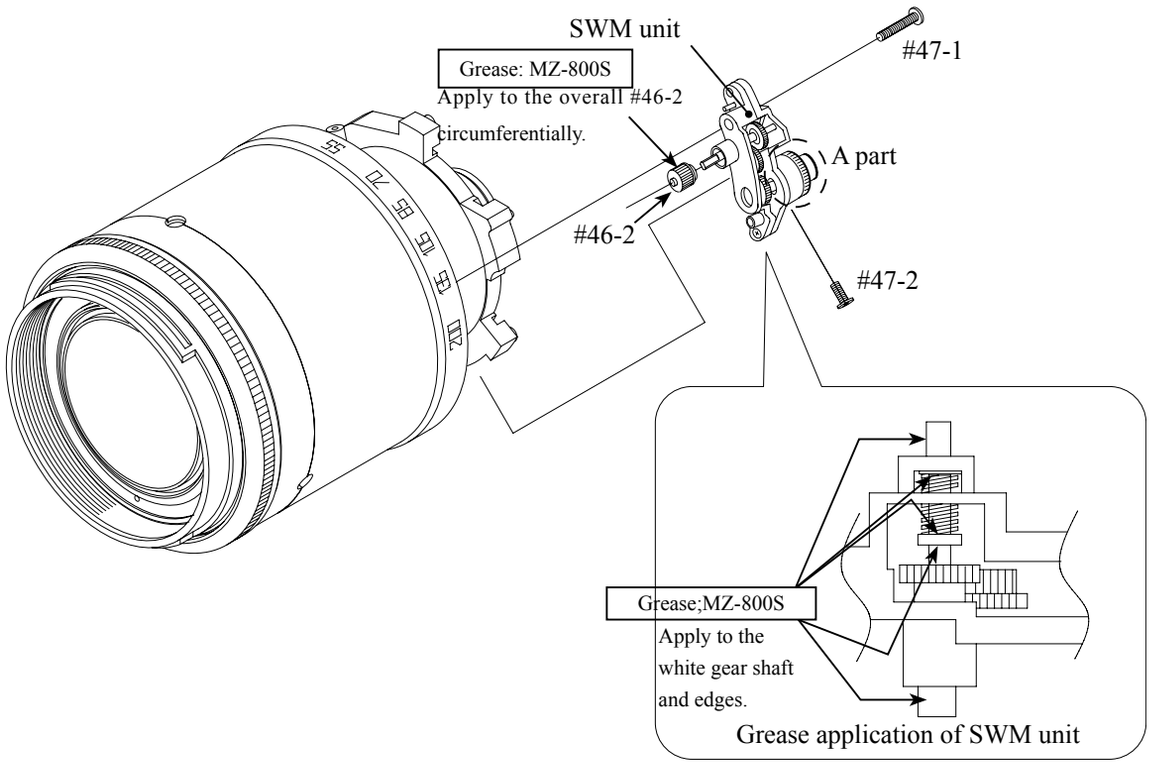


Zoom brush



SWM unit

Note: Do NOT touch "A" part directly with hand.

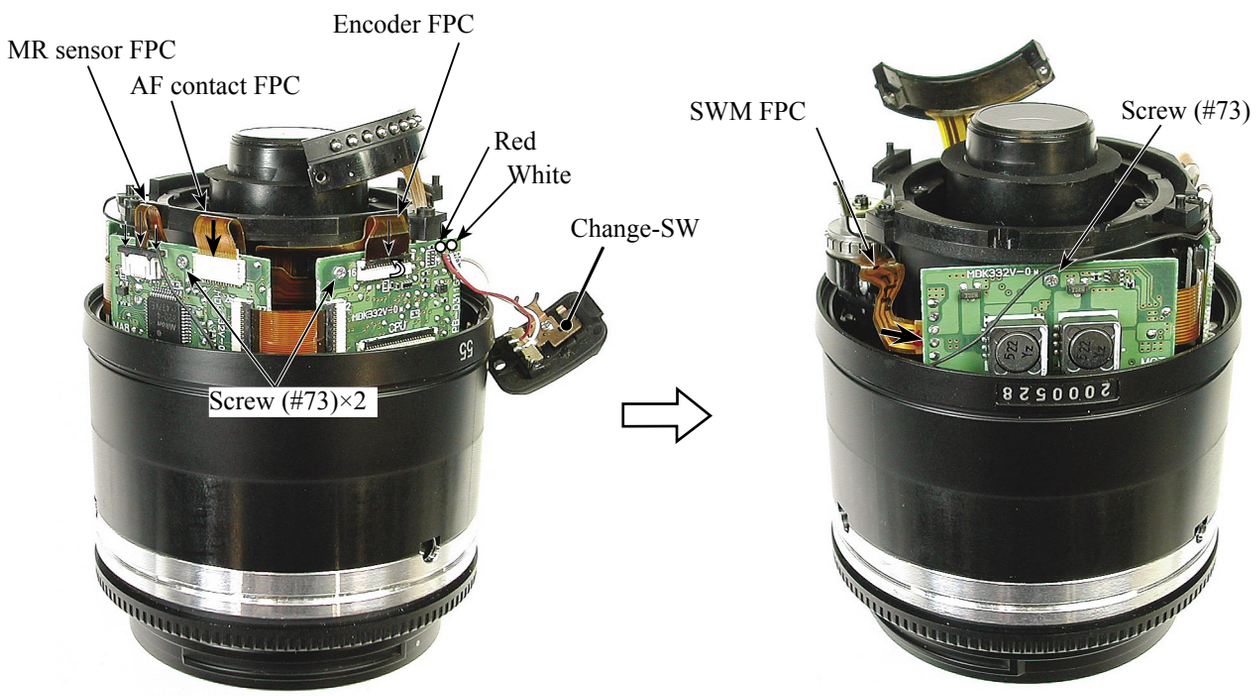


Main PCB unit

① Fix the main PCB with 3 screws (#73).

② Connect each FPC of the MR sensor, AF contact, encoder, and SWM to each connector.

③ Solder the red and white wires of the change-SW.



Index ring / Mount unit

① Set the change-SW to A side, and pass it through the hole of the index ring.

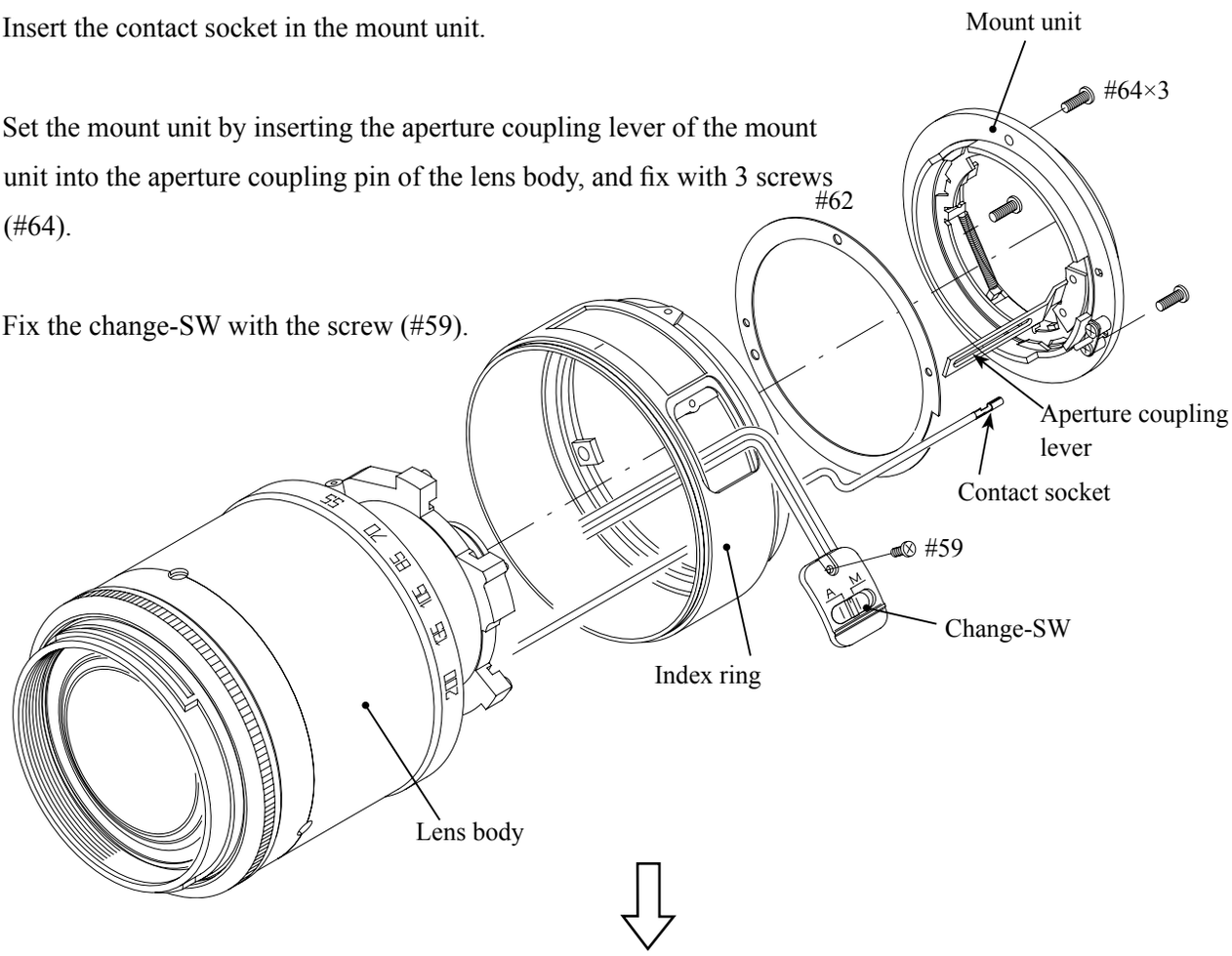
② Align 3 screw holes of the index ring with 3 screw holes of the lens body to assemble them.

③ Put the FB adjusting washer (#62) on the lens body.

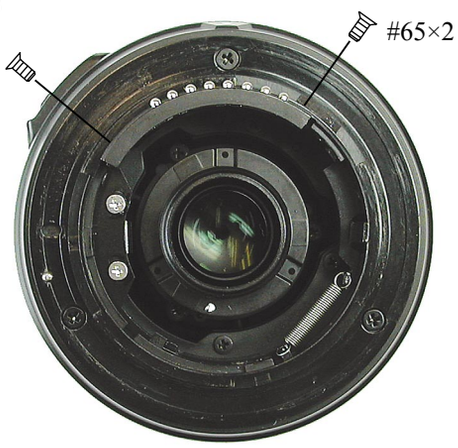
④ Insert the contact socket in the mount unit.

⑤ Set the mount unit by inserting the aperture coupling lever of the mount unit into the aperture coupling pin of the lens body, and fix with 3 screws (#64).

⑥ Fix the change-SW with the screw (#59).



⑦ Fix the AF contact unit with 2 screws (#65).



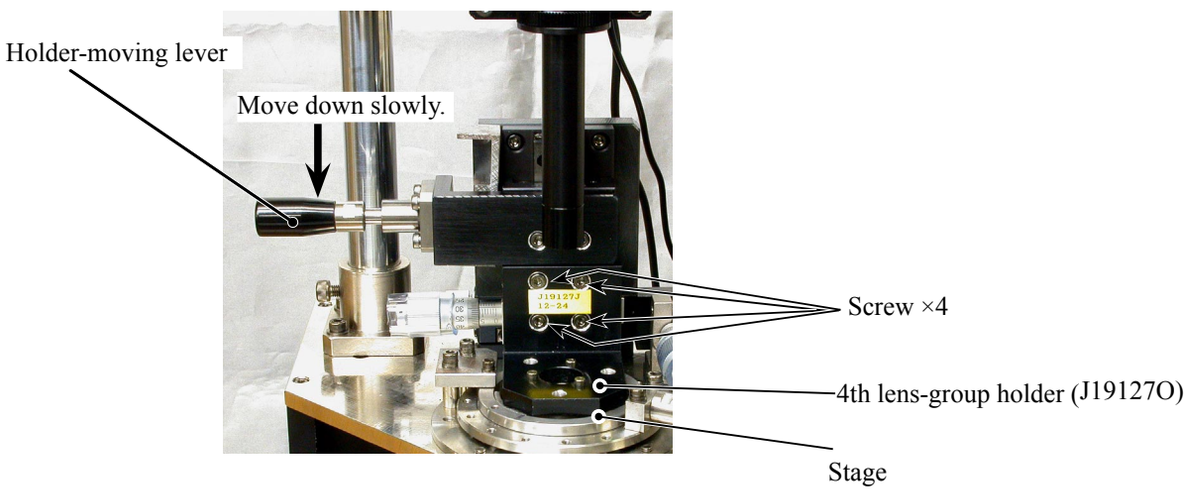
Lens Alignment

Note: This adjustment is required when the 2nd or 4th lens group is removed.

(1) Preparation of Lens optical alignment equipment

・ Attach the 4th lens group holder (J19127O) to the lens alignment equipment for center.

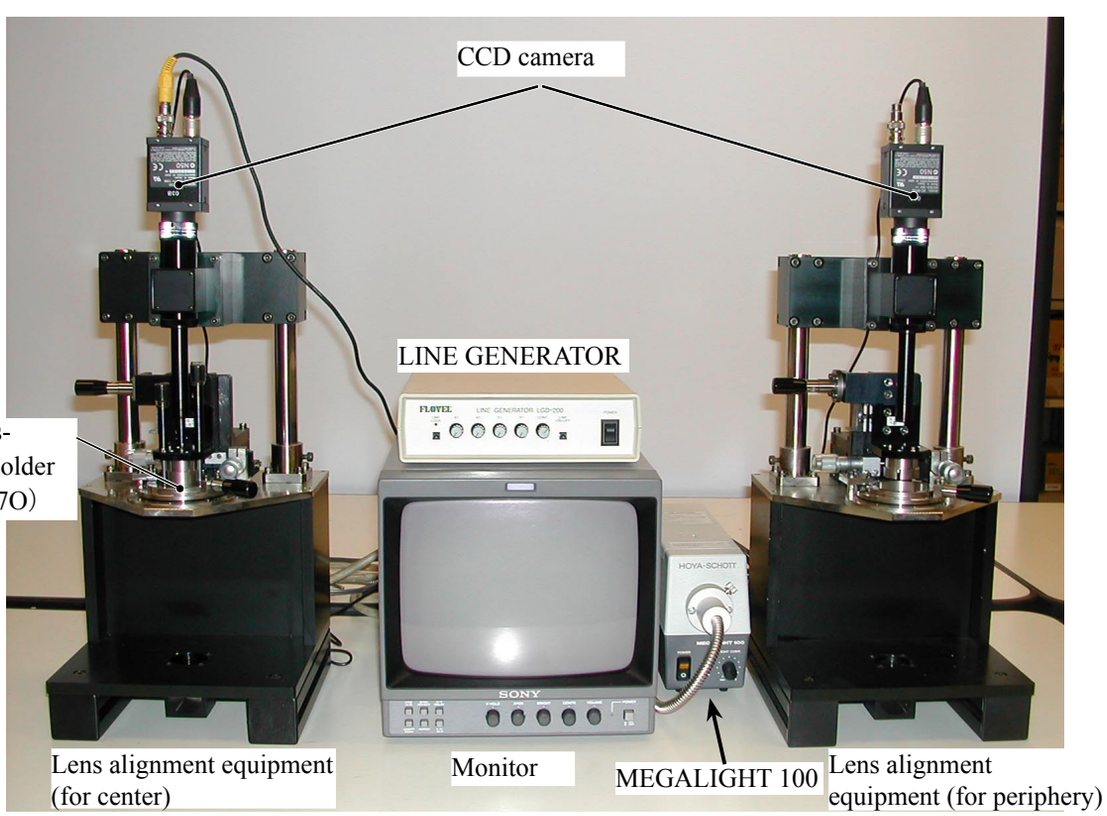
How to fix: Move down the holder-moving lever slowly so that the holder touches the stage. Then tighten 4 screws to fix it.



・ Create the center positioning tool (ref. Page A27 for how to create it).

・ Create cardboards in which "Lens alignment chart" and "Viewers" are fit. (ref. Page A29, 30 for how to create them.)

Lens optical alignment equipment (for center and periphery)



Back view of Lens optical alignment equipment (for center and periphery)

・ Connect each cable to the appropriate equipment with the same number. (e.g. Connect up ① to‘ ①)

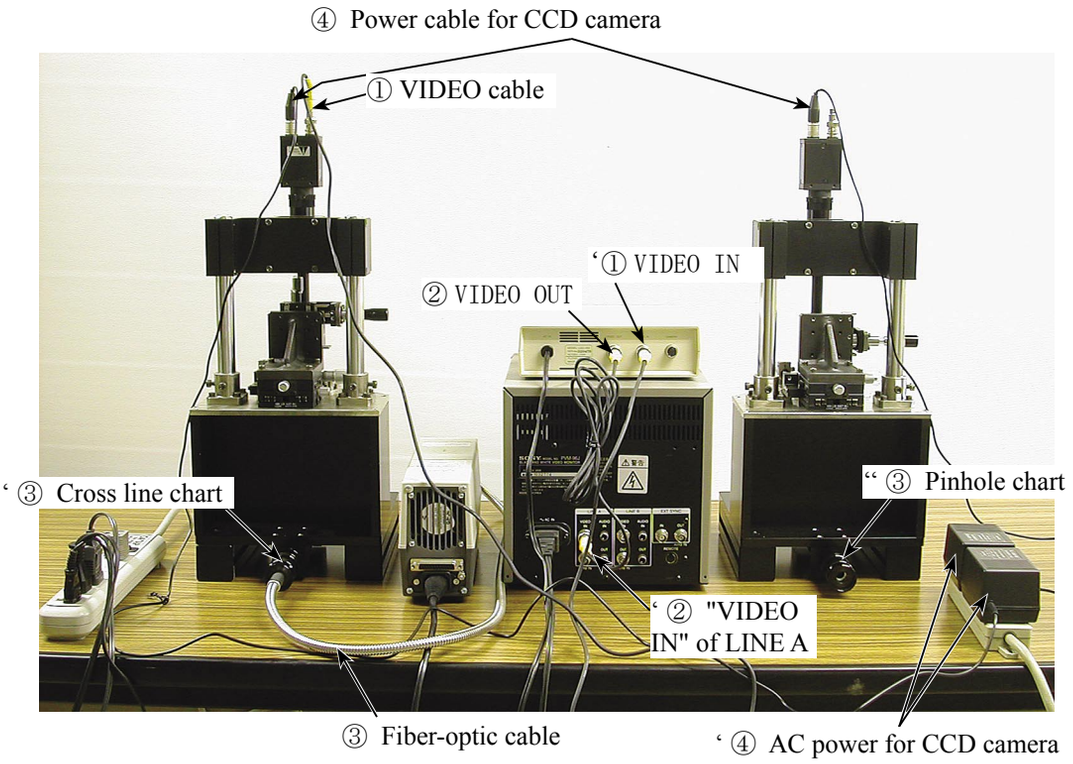
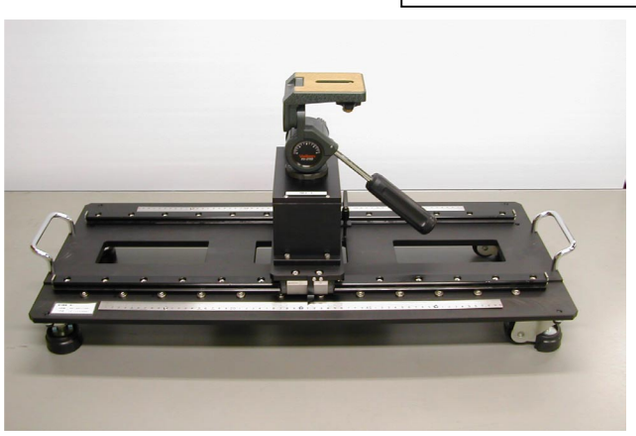
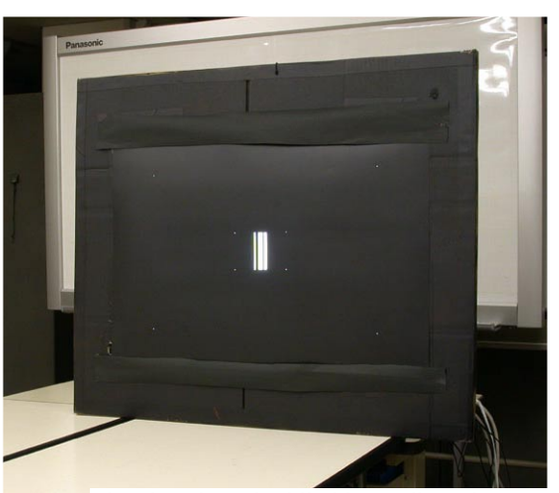


Chart shooting equipment for 4th lens group alignment



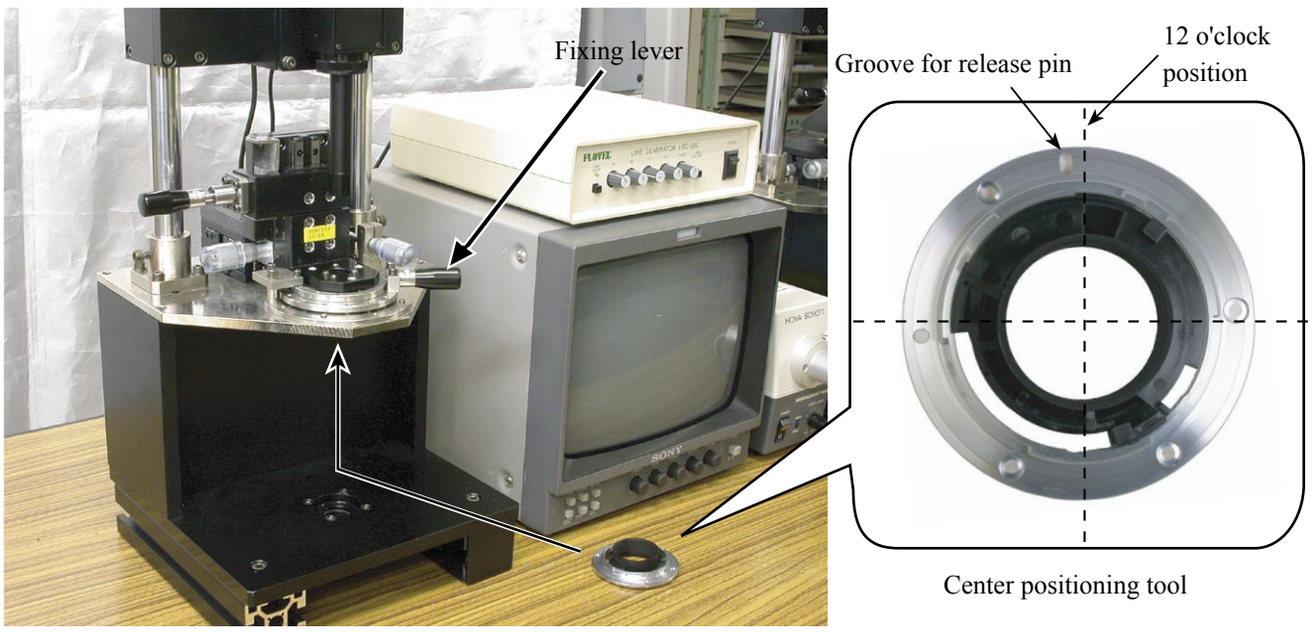
Slide rail for Lens alignment equipment



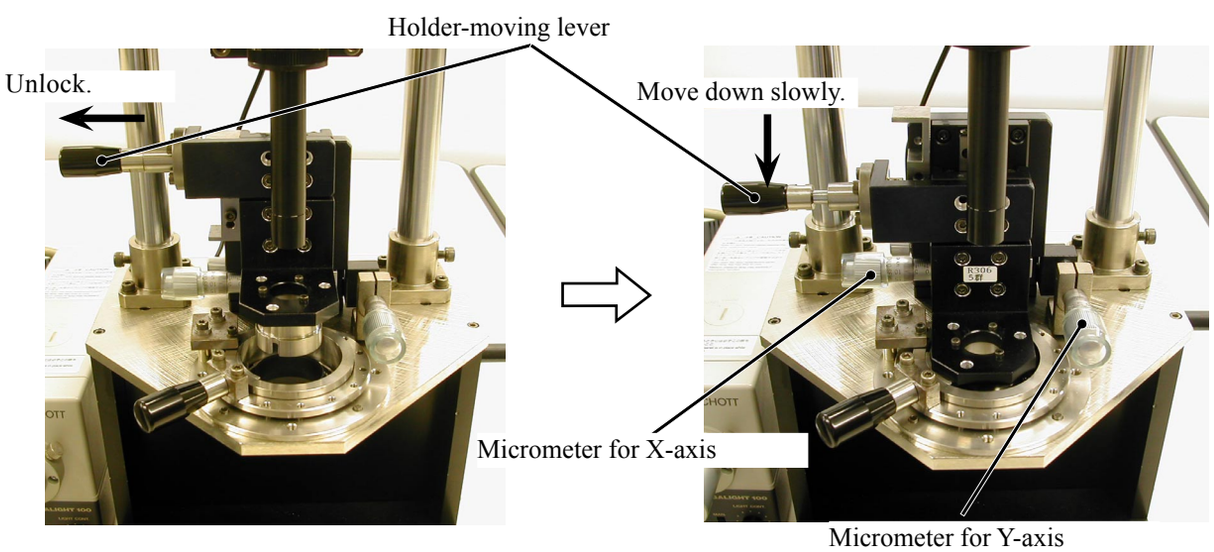
The chart is embeddied in cardboards.

(2) Center positioning of Holder

① Mount the (self-made) center positioning tool on the lens alignment equipment for 24-85/3.5-4.5G by positioning the groove slightly toward the counterclockwise direction from the below 12 o'clock position. Then turn the tool clockwise all the way to the right, and move the lever to the left to fix it.



② Unlock the holder-moving lever, and move the holder down slowly by the lever.

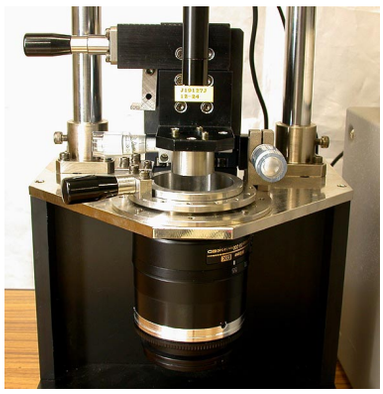


③ Adjust the holder's position by rotating the micrometers for X-axis or Y-axis so that the holder comes almost to the center of the stage.

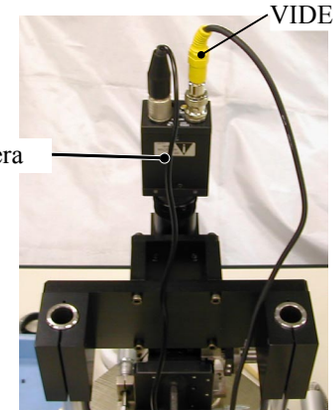
④ After the above holder adjustment is completed, move the fixing lever of the alignment equipment to the right, and remove the center positioning tool from the equipment.

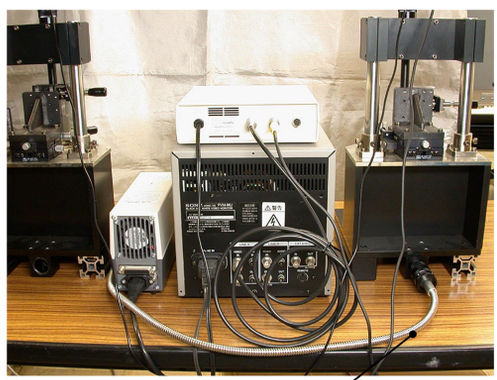
(3) 4th lens group alignment (Center alignment)

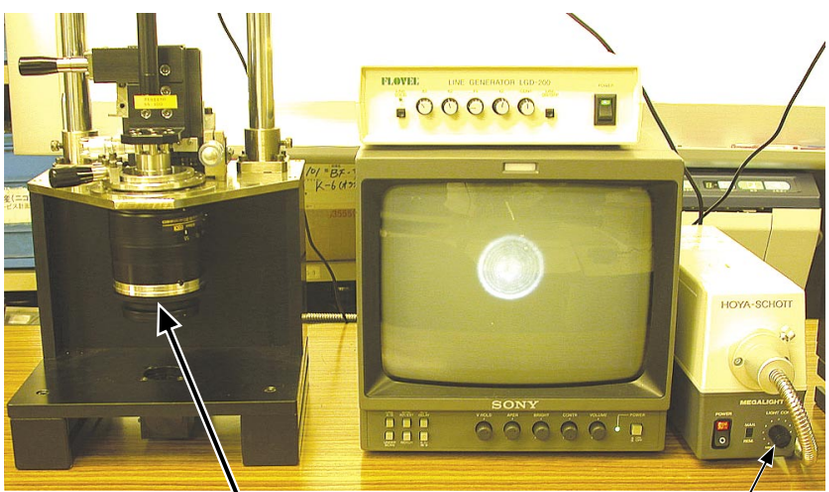
① Mount the lens in the equipment (for center). (ref. ① of (2) for how to fit in it.) Set the zoom ring to WIDE-end (55 mm side).



② Connect the VIDEO cable, which comes from the terminal of the CCD camera, and the fiber-optic cable, which comes from MEGALIGHT 100, to the alignment equipment for center. Then rotate the LIGHT CONT. knob of MEGALIGHT 100 to adjust the brightness so that the pinhole image appears on the monitor. Also turn the lens focus ring to adjust the shape. (ref. Pic 1 for pinhole images.)







Pic.1

③ Check the pinhole shape on the monitor. In case of "A" of Fig. 1, set the zoom ring to TELE side (200 ㎜) and check the shape again. If it is also "A" of Fig. 1 even at TELE side, remove the lens from the alignment equipment for center and go to "(4) Chart shooting for the 2nd lens group alignment". If it is the case of "B" or "C", go on to ④ of the next page for lens adjustment.

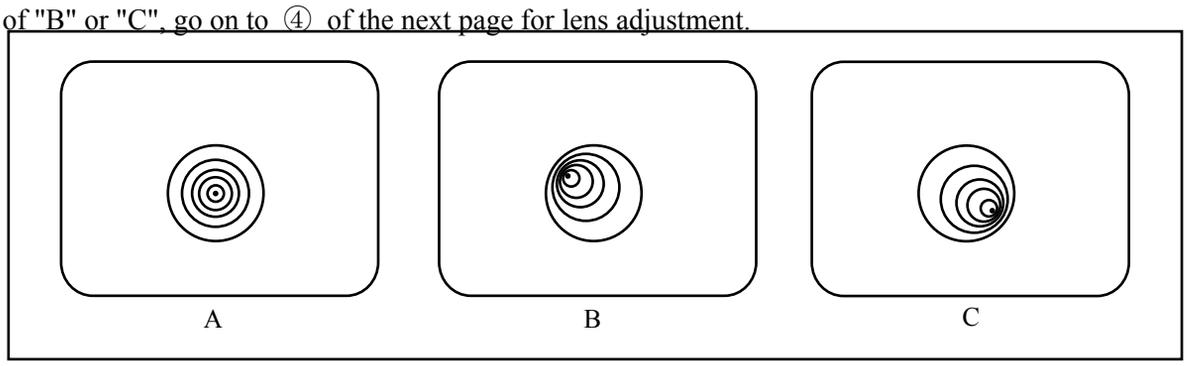
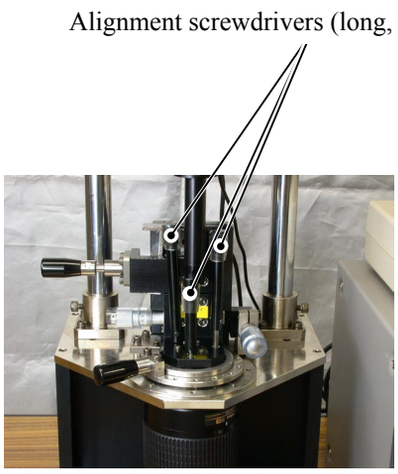


Fig.1

④ Set the lens zoom ring to WIDE-end (55 mm side).

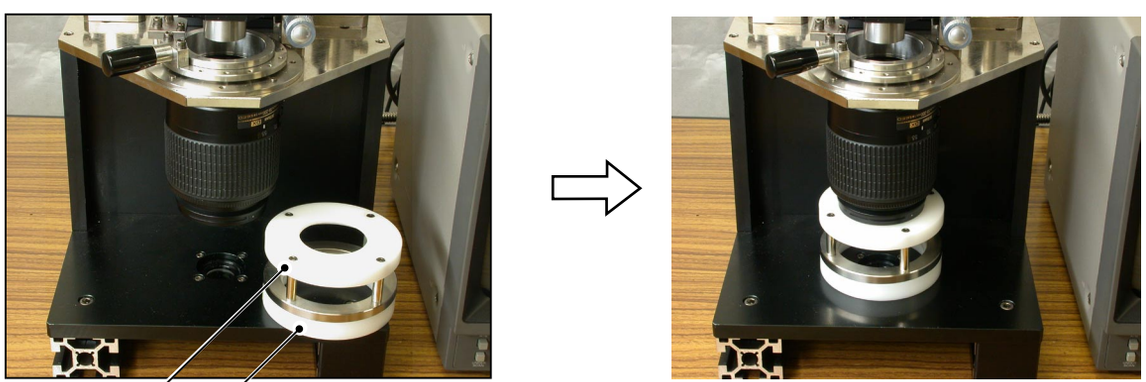
⑤ Insert the 3 alignment screwdrivers (long, middle, short) into the 4th lens-group holder (J19127O) to loose 3 screws of the 4th lens-group chamber.



⑥ Unlock the holder-moving lever, and move the holder down slowly by the lever. Insert the 3 alignment screwdrivers (long, middle, short) and loosen 3 screws of the 4th lens-group chamber.

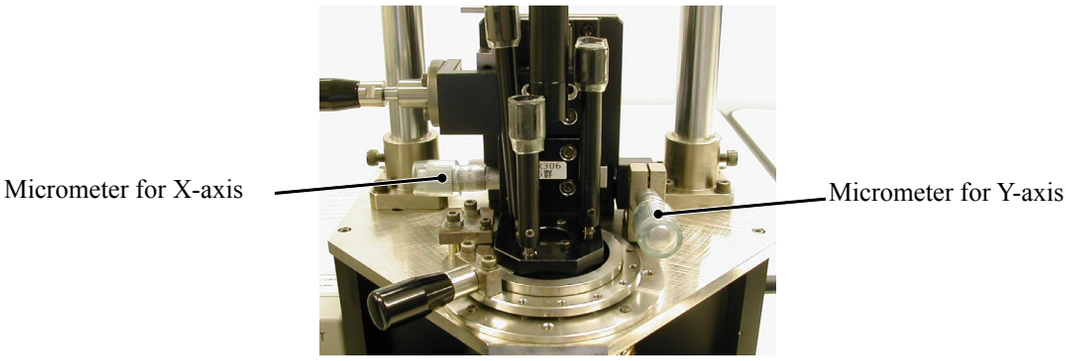
Note (1) Because the screws cannot be seen, when inserting the alignment screwdrivers, put them straight down in the screw holes so that the screws can be easily found.

(2) In case the lens is turned from WIDE (55 mm) to TELE (200 mm) during adjustment, put the zoom fixed base and spacer D right under the lens.



⑦ Rotate the micrometer (X, Y) so that the shape on the monitor become "A" of Fig.1.

Note) Moving up the holder changes the shape on the monitor, so make an adjustment by considering this change.



⑧ When the shape becomes "A" of Fig. 1, tighten 3 screws of the 4th lens-group chamber, move up the holder-moving lever slowly to lock, then remove the zoom fixed base and spacer D from the alignment equipment.

⑨ If there is no problem with WIDE side, set the zoom ring to TELE (200 mm) and conform that the shape is like "A" of Fig.1.

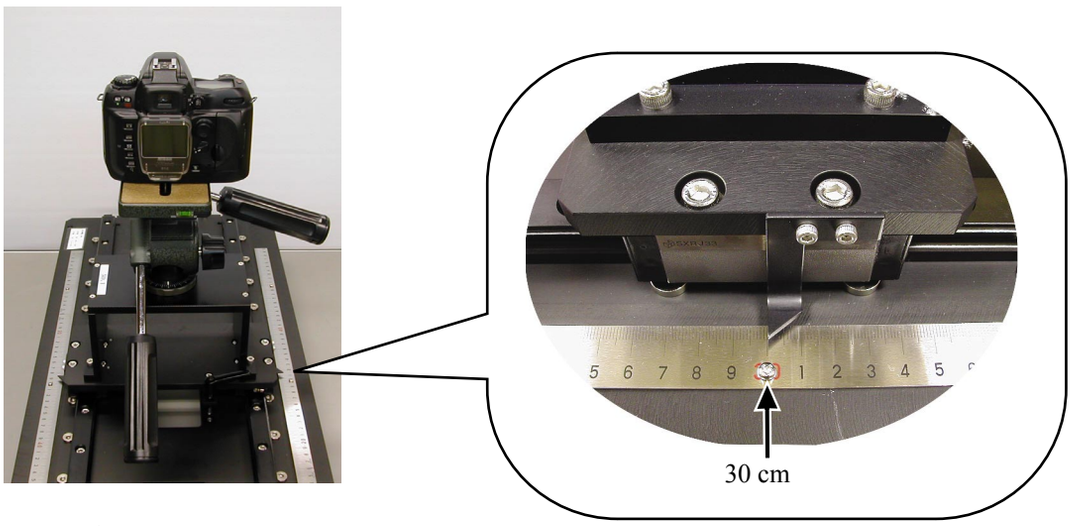
⑩ If the shape is not like "A" of Fig. 1 at TELE (200 mm) side, set the lens to WIDE (55 mm) side again. Go back to the previous ⑥ and loose the screw of the 4th lens-group chamber, then make an adjustment until the shape becomes "A" of Fig. 1 at TELE (200 mm) side in ⑨, too.

⑪ Turn the monitor, LINE GENERATOR, and MEGALIGHT 100 each to OFF, and remove the lens from the alignment equipment.

(4) Chart shooting for the 2nd lens group alignment

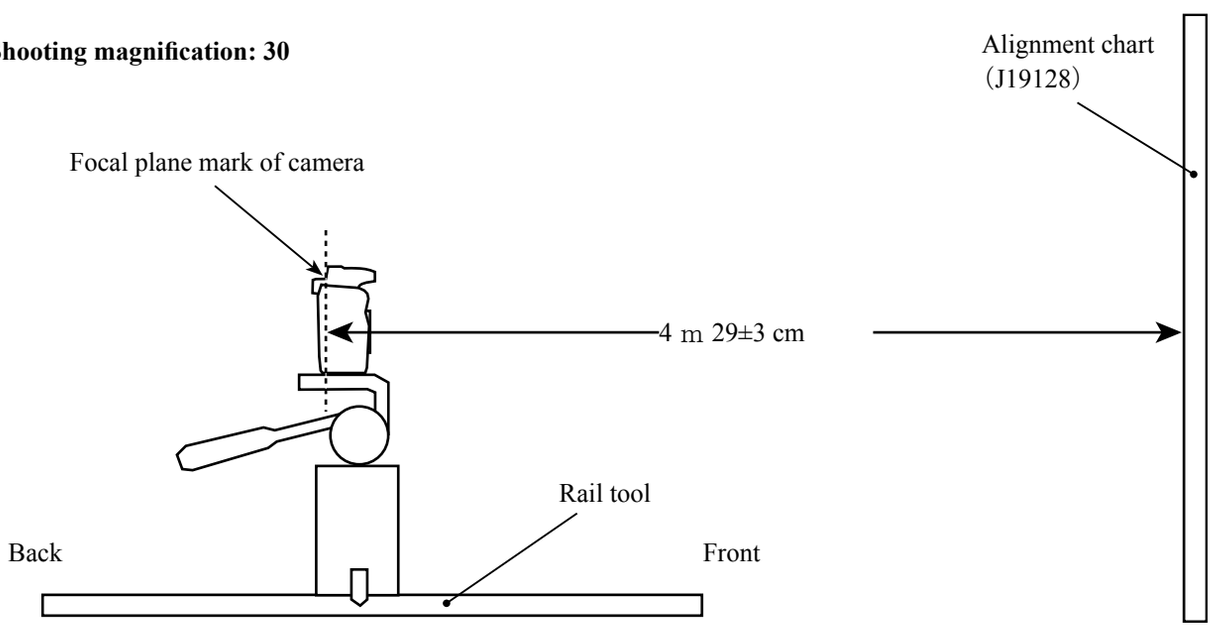
① Prepare a camera (D100). Set the shutter speed to “M1/60”and the focus mode to “M”. On the shooting menu, set “Image Quality” mode to “RAW”, “WB” to “Preset”and “ISO” to “200”.

② Set up the camera (D100) on a tripod on the slide rail. Set the indication pointer of the tripod to 30 cm.



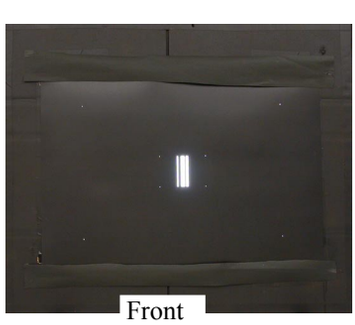
③ Set the alignment chart (J19128) as shown below.

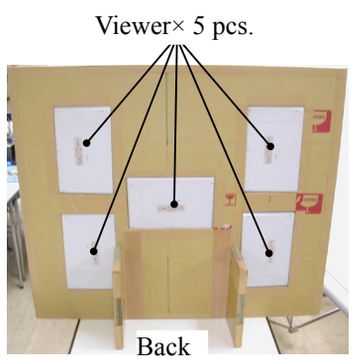
Shooting magnification: 30



④ Turn the power of viewers (5 pcs.) to ON.

(Note: If the batteries of viewers are exhausted with decreased brightness, the shooting data cannot be obtained correctly.)

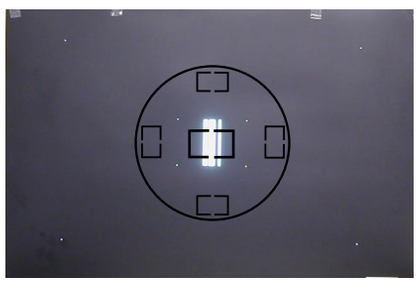




⑤ Fit the lens to be examined in the camera (D100). Set the zoom to MIDDLE (135 mm).

⑥ By looking through the viewfinder, adjust the height and tilt to make the chart fill the entire finder field frame.

⑦ Adjust the tilt of the slide rail to make the 3 chart lines position in the center of the viewfinder, when the tripod is slid all the way to the front and back.

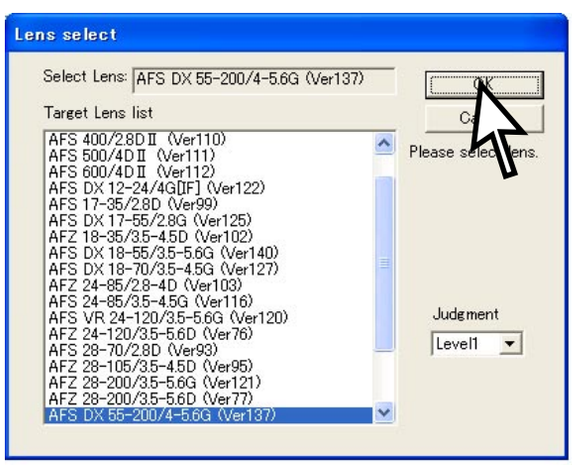


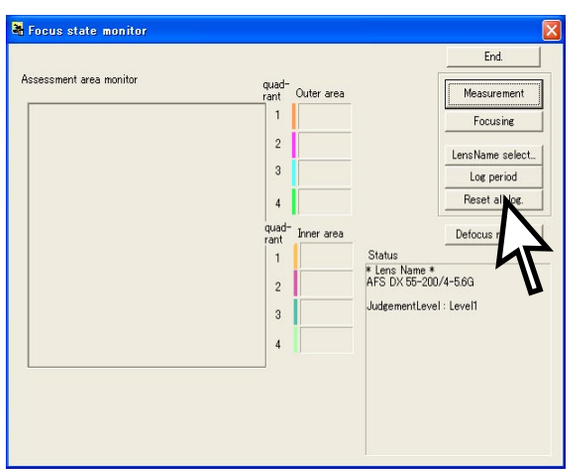
⑧ Connect the PC and camera via USB cable. (Camera setting: Mass Storage)

⑨ Start the adjustment software (LWM.exe).

⑩ The window of "Lens select" opens. Select "AFS DX55-200/4-5.6G" and click "OK".

⑩ "Click the "Reset all log" button.





⑫ Set the tripod back to the position of 30 cm. Set the A/M change mode of lens to "A".

⑬ Set the focus ring to "Close" distance. When "Focusing" button is clicked, the AF of camera operates, releasing the shutter.

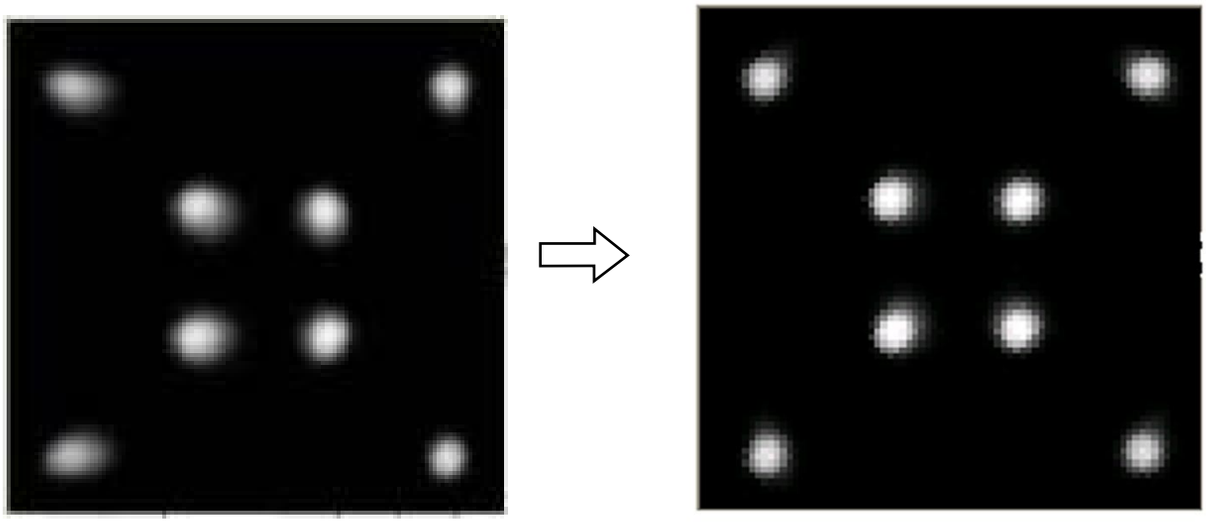


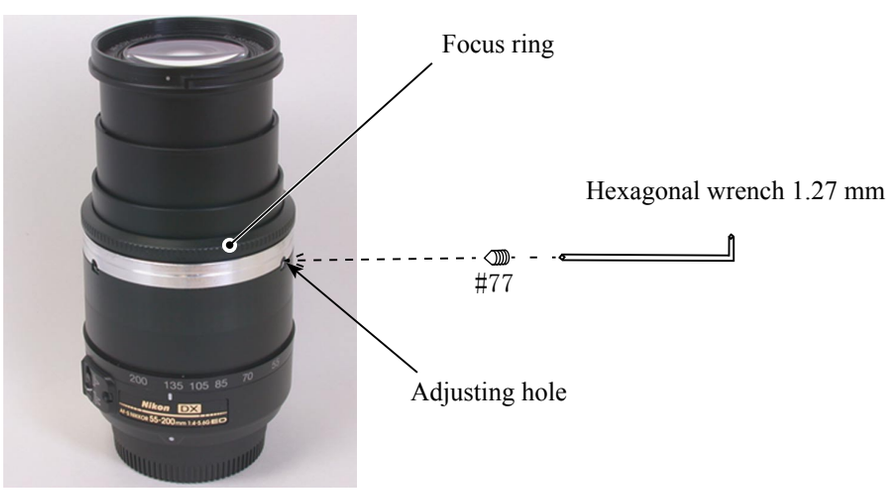
Image 1 Image 2

⑭ When a point image at 30 cm-distance is viewed, if the shape is bigger or the image is blurred or flows like in "Image 1", make an rough periphery adjustment of lens.

The adjustment is as follows:

1) Remove the rubber ring, if it is attached to the zoom ring.
2) Set the A/M change-SW to "M".
3) With the zoom ring being set to 135 mm, turn the focus ring so that the 2nd lens group can be seen through the adjusting-holes.
4) Viewed through 3 adjusting holes, if the screw is attached, insert and turn the hexagonal wrench (1.27 mm) through approx. every 90° clockwise until the point image becomes like "Image 2" by "Focusing" of the adjustment software. If there are no screws viewed through 3 adjusting-holes, at first put and push the adjusting screw (#77) (see below Pic. 3) until it touches the screw hole, and fix the screw by turning (with the hexagonal wrench) through about 180° and then turn it so that it becomes like "Image 2".

Note) If the adjusting screw (#77) is turned through approx. every 90° clockwise and if the shape of point image becomes worse, do NOT turn any more. In this case, put the hexagonal wrench into other adjusting-holes to make an adjustment. If it becomes necessary to turn counterclockwise, remove the screw once, and turn again to make a readjustment.

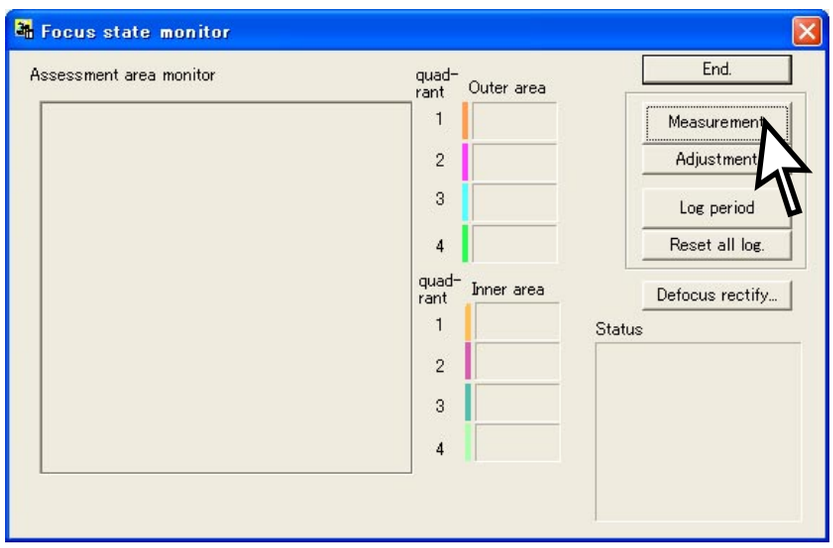


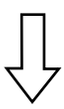
Pic.3

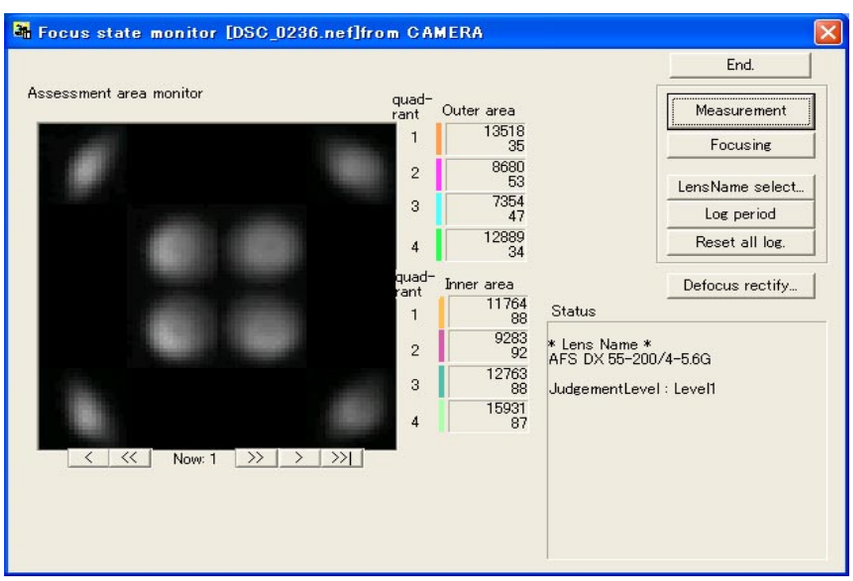
⑮ If the point image of ⑭ becomes like "Image 1", set the focus mode of camera (D100) to "M".

⑯ Slie the tripod to the front by 18±0.1 cm.

⑰ Click the "measurement" button of the adjustment software.







⑱ When the shutter of the camera is released, slide the tripod to the back by 6 ± 0.1 cm and make a remeasurement.

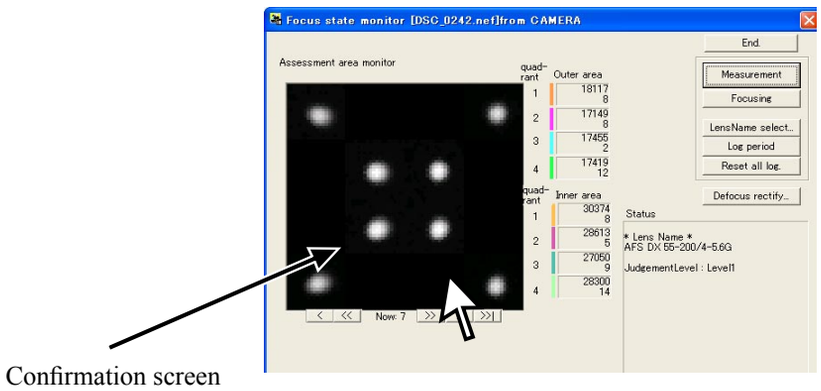
⑲ Again, slide the tripod to the back by 6 ± 0.1 cm and make a remeasurement.
Repeat this operation 4 more times, totalling in 7 measurements. (The total sliding distance is 36 cm.)

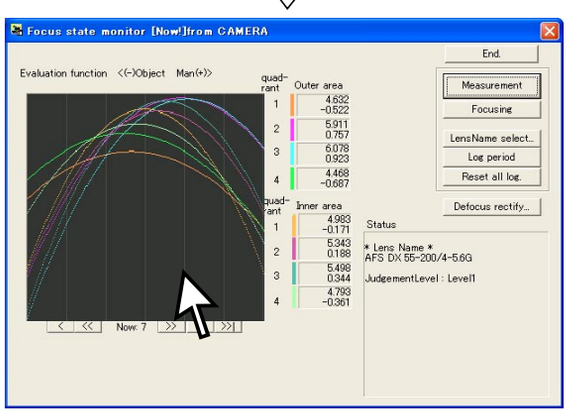
Note 1: When the below warning is given, there may be some defects in the brightness of the viewers and/or parallelism of the chart and camera, etc. So correct the above and make a remeasurement.

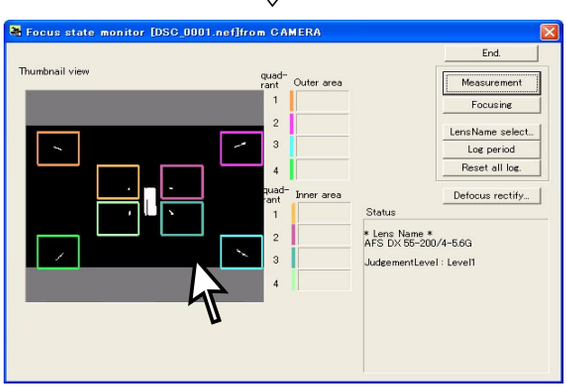
Note 2: When the below warning is given, recheck that the Quality mode of the camera is set to RAW.

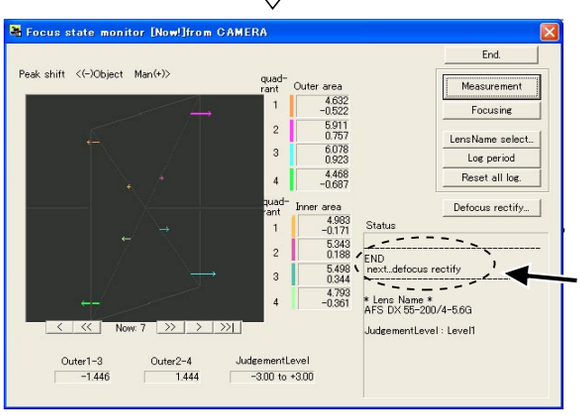
⑳ After the 7 measurements, point the cursor to the confirmation screen of the software. Click it 3 times, and if "END" is displayed on the Information, the lens optical alignment is completed.

If "END" is NOT displayed (ex. need Adjustment), turn the periphery adjusting screw through about every each 45°and make an adjustment.









ref.:

After the 7 measurements, find the arrow of which the direction extends most rightward on the confirmation screen. If it is placed at "1 image appearance", insert the adjusting screw (#77) into "A" of Fig. 2, while "2 image appearance" or "3 image appearance" into "B" of Fig. 2, and also "4 image appearance" into "C" of Fig. 2. Then turn the screw.

(e.g. In the sample image of Fig.1, the arrow of "4 image appearance" extends most rightward, so insert the screw into "C" of Fig.2 for the adjustment.)

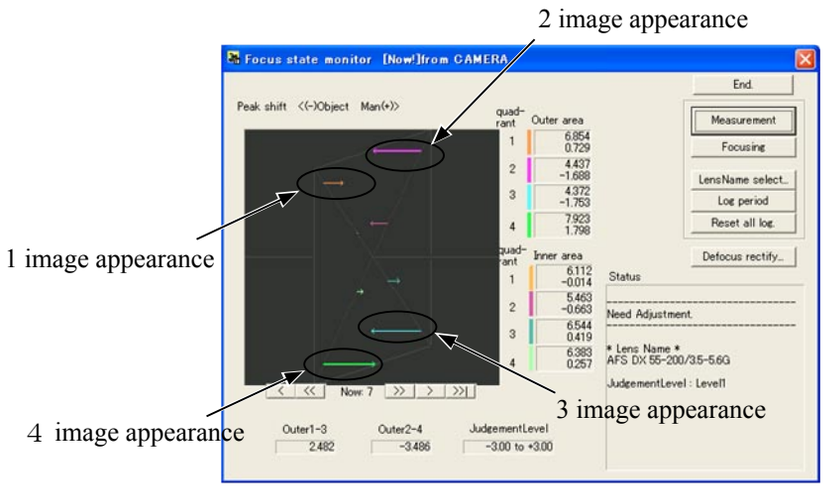


Fig. 1

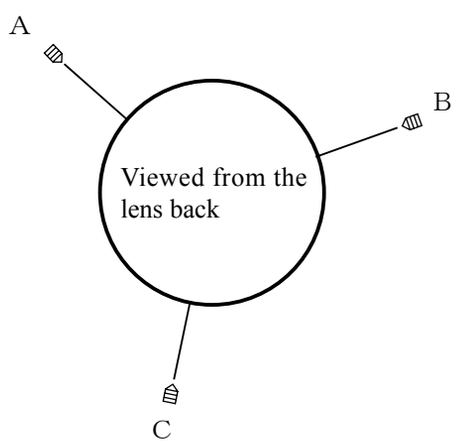


Fig.2

How to create positioning tool of Rear lens-group holder for lens alignment (AF-SDX 55-200/4--5.6G)

1: Summary

1-1: This is a positioning tool of the rear lens group holder for lens alignment, in order to secure the position for attaching the rear lens group temporarily.

2: Preparation

2-1: The following is used:

- ＊ Rear cover ring (JAA78071- Part no. :1K631-287) X 1 pc.
- ＊ Bayonet mount (JAA78071- Part no.: 1K404-157) X 1 pc.
- ＊ Mount rotation stopper screw (JAA78071- Part no.: 1K120-012) X 1 pc.

Put with the groove, in which the lock pin of camera body enters, just upward.

3. Procedure

3-1: Put the bayonet mount as shown in Fig. 1.

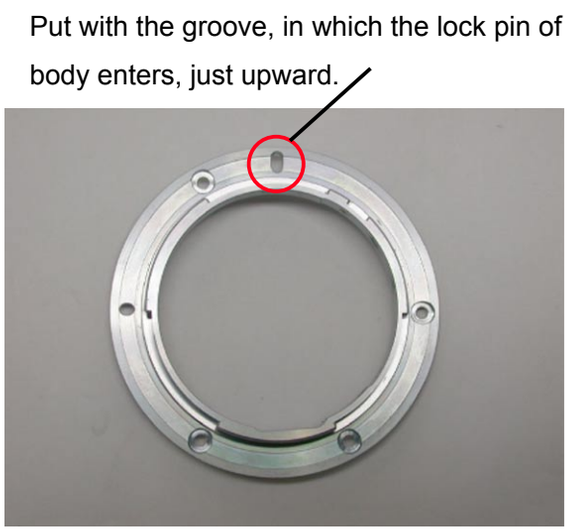


Fig. 1

3-2: Mount the reversed rear cover ring on the position of Fig. 1, and attach them as shown in Fig. 2.

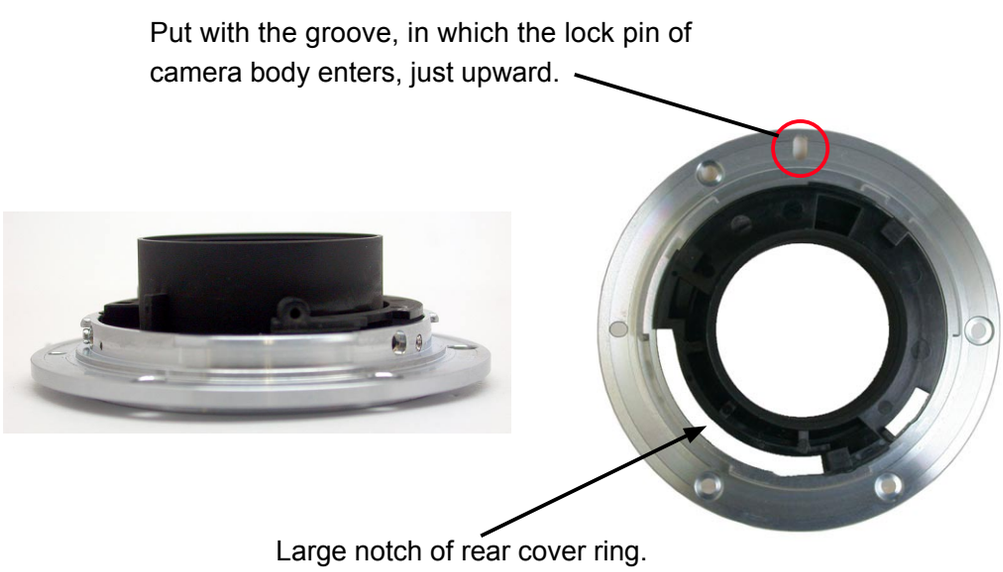


Fig. 2

3-3: Turn the rear cover ring clockwise, which was attached to the bayonet mount. Then stop at the position as shown in Fig.3-1.

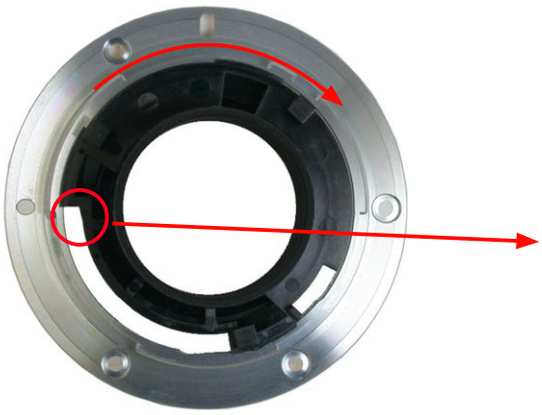


Fig. 3

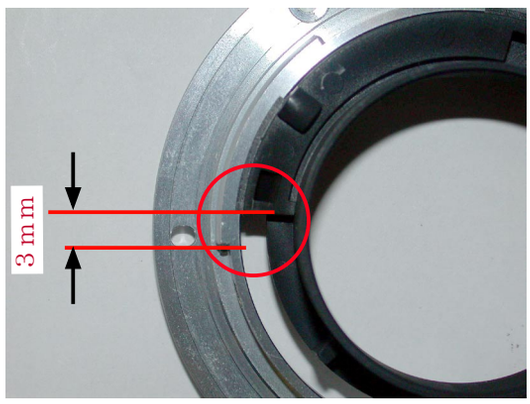


Fig. 3-1

3-4: Fix the following 3 locations of the rear cover ring with the instant glue.

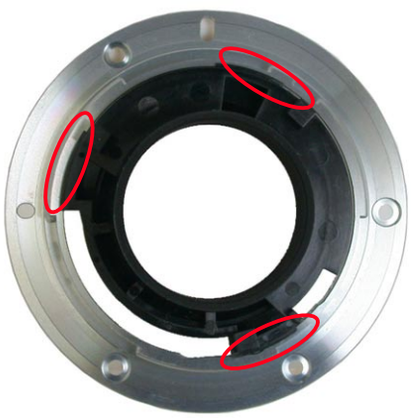
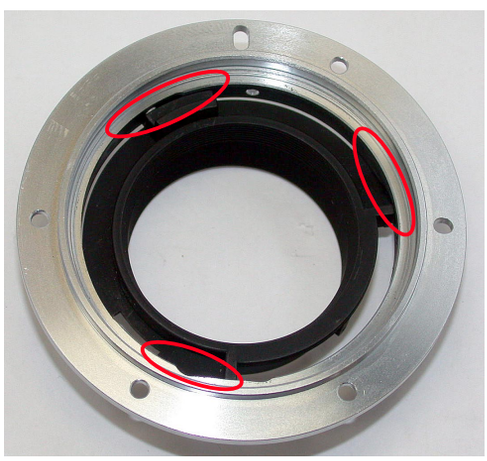


Fig. 4

3-5: Turn the bayonet mount over. Reinforce the following 3 locations with the adhesive to attach the bayonet mount and rear cover ring firmly.



3-6: Attach the mount rotation stopper screw at the appropriate position.

(Note) Refer to Lens Repair Manual for how to handle this tool.

How to create Setting board of "Lens alignment chart" and "Viewer"

1. Summary

1-1: In order to get necessary data for lens alignment, this board is created to use for setting a special chart and light viewers (for chart illumination), while taking pictures of the special chart with a digital camera.

2. Preparation

2-1: Prepare a board (760 x 880 x 20 mm) or 2 package cardboard boxes (size 2.33).
(Note) Because you have to cut out the shape to embed light viewers, choose package cardboard boxes (size 2.33) or material which can be easily cut. ― ref. Fig. 1

3. Procedure （In this document, 2 package cardboards are used）

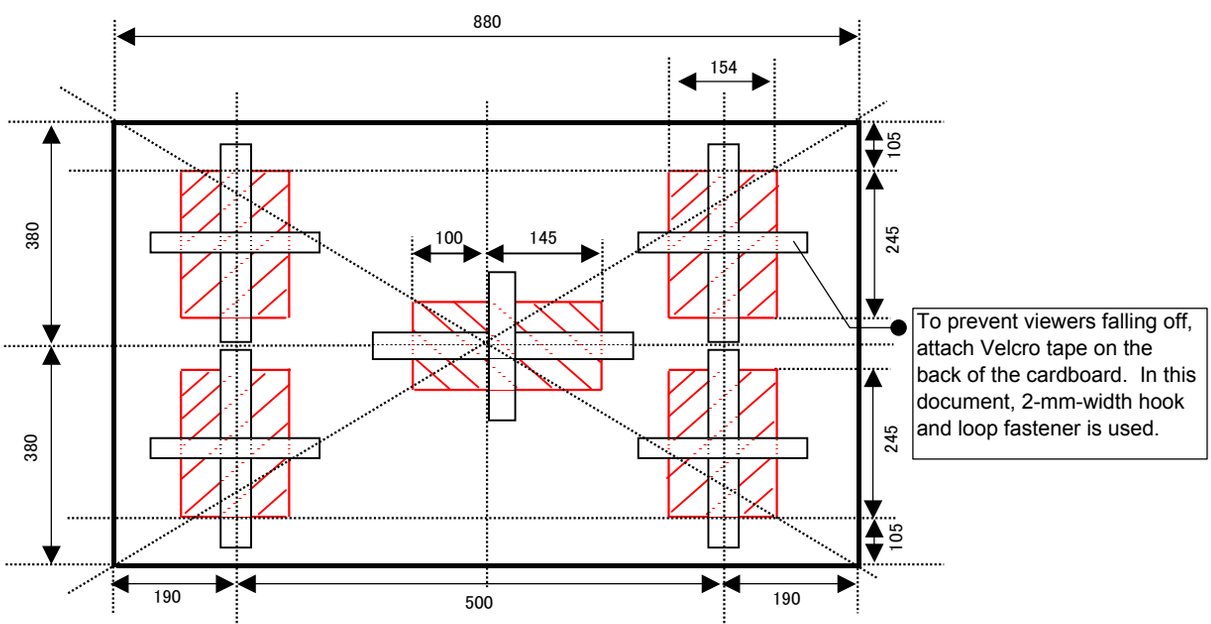
3-1: As for the 1st flattened cardboard box (size 2.33), check the positions for embedding the light viewers, and cut out the shape at 5 locations (shaded parts/size 154 x 245 mm) as shown below. ―ref. Fig. 2
(Note) Cutting the shape slightly smaller than the actual size of viewers makes it easier to fit the positions of viewers tightly.

3-2: Put the 2nd flattened cardboard box (size 2.33) and the above cut-out 1st cardboard together as one, and fix them by taping at 4 sides. ― ref. Fig. 3

3-3: Then as for the 2nd flattened cardboard box, cut out the shape again by matching the cut-out size of 3-1 for each viewer. ― ref. Fig. 4

3-4: Reinforce the edges of cut-out parts with tape.
(Note) To prevent viewers falling off, secure them with tape around the edges. ― ref. Fig. 5

3-5: Blacken around the setting board(with black spray,etc).

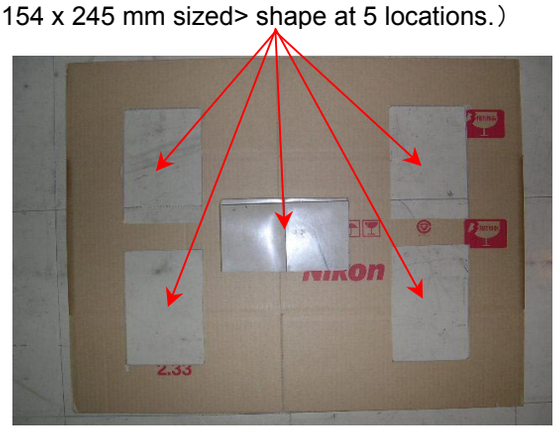


4. Prevent Viewers from falling off (In this document, 2-mm width Velcro tape is used.)

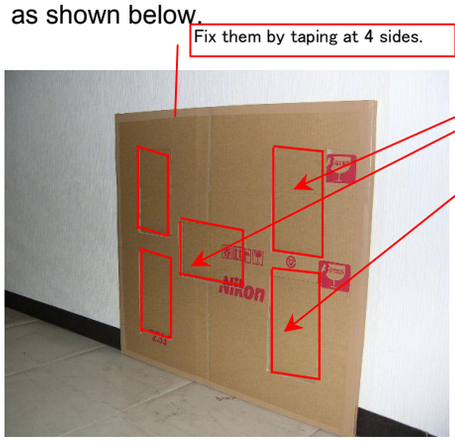
4-1: As shown above, when viewers are embedded, secure them with square pieces of Velcro tape (hook and loop fastener) on the back of the cardboard to prevent viewers falling off.

(Fig. 1- Prepare 2 package cardboard boxes, and flatten them as below.)

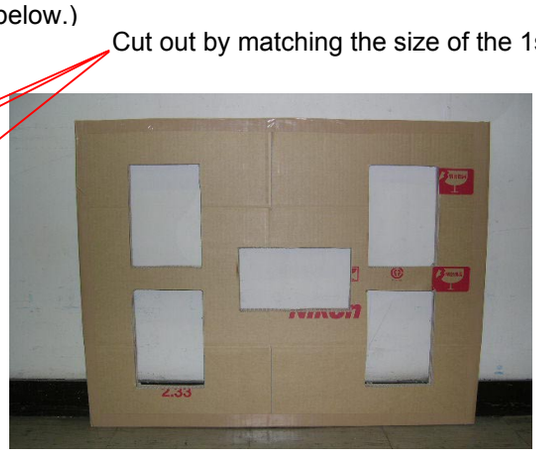
(Fig. 2 - As for the 1st flattened cardboard box, cut out the <154 x 245 mm sized> shape at 5 locations.)



(Fig. 3- Package cardboard boxes)
Put the 2nd flattened cardboard boxe and the 1st cut-out cardboard together as one as shown below.

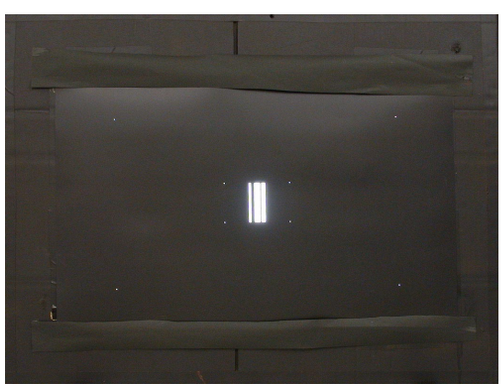


(Fig. 4- As for the 2nd flattened cardboard box, cut out the shape in the same way as Fig.2. All cardboards are cut out as below.)



(Fig. 5- Light viewers are embedded.)

(Fig. 6 - cartoon box is blackened with the chart being attached.



Adjustment (Division) of Focus movement (T, W)

1. Turn the focus ring all the way to the infinity-end.
2. Fix the aperture lever so that the aperture becomes full.
3. Read each value of WIDE and TELE sides.
4. Calculate as follows:

（A － B）÷4.5 ＝ C　　A ＝ Value at TELE side
B ＝ 3.51 (Target value)
C ＝ Adjustment amount (mm) of the washer (#3) of the 1st lens group

5. Adjust the washer (#3) by increasing/decreasing by the above value of C. If C is plus, increase the thickness of it, while it is minus, decrease the thickness of it. (ref. Page A3)

Note: When the washer (#3) is put, place a thin washer between thick washers

Adjustment of F.F.D (Back focus)

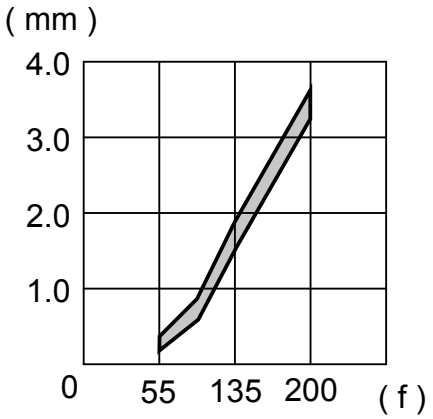
1. Turn the focus ring all the way to the infinity-end.
2. Fix the aperture lever so that the aperture becomes wide open.
3. Read the value of Wide and Tele side.
4. Remove the bayonet mount.
5. Adjust the washer (#62) by increasing/decreasing by the difference from the standard value. If the difference is plus, increase the thickness of it, while it is minus, decrease the thickness of it. (ref. Page A13)

△Vertical-type collimeter

Focal length （ f ）	Standard (mm)
55 mm	＋ 0.2 ～＋ 0.40
135 mm	＋ 1.606 ～＋ 1.906
200 mm	＋ 3.361 ～＋ 3.661

△Horizontal-type collimeter

Focal length （ f ）	Standard (mm)
55 mm	0.0 ～＋ 0.10
135 mm	－ 0.1 ～＋ 0.30
200 mm	－ 0.1 ～＋ 0.40



サービス計画課 M

Aperture diameter adjustment

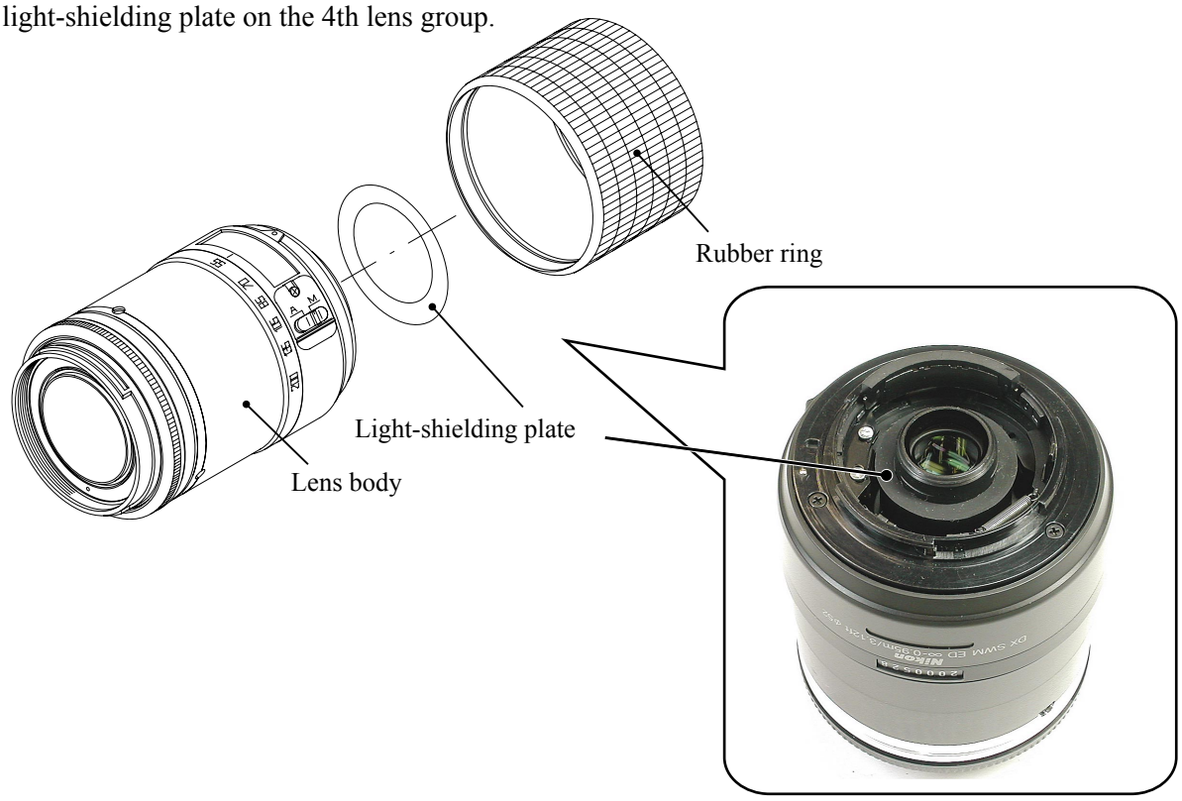
① Mount the tool (J18004-1) and check the aperture diameter.

Standard: Full aperture

② In case it is out of standard, adjust the position of the aperture lever (#63-3) by loosing 2 screws (#63-4).

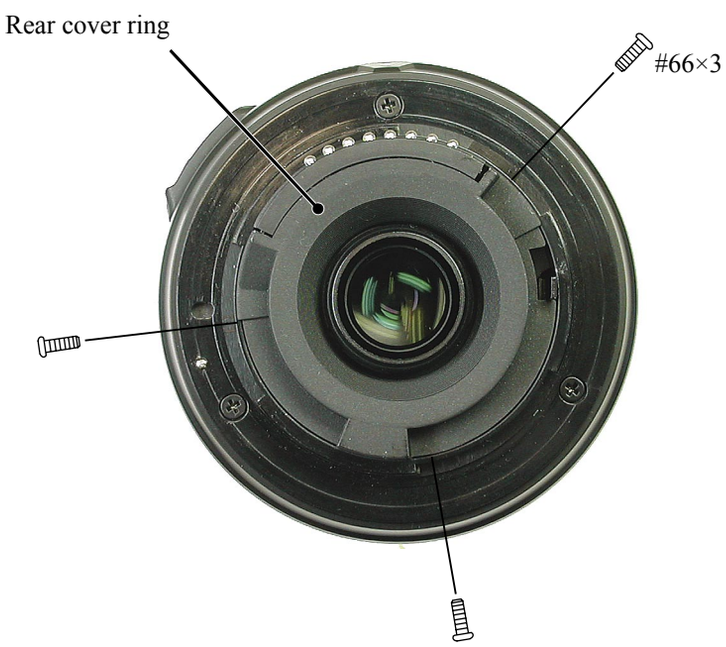
Light-shielding plate / Rubber ring

- Attach the rubber ring to the lens body.
- Put the light-shielding plate on the 4th lens group.



Rear cover ring

- Fix the rear cover ring with 3 screws (#66).



Preparation for inspection & adjustment of main PCB

● In case of replacing the main PCB, SWM unit or MR encoder unit, be sure to make the necessary adjustments as follows:

1. Adjustments
   - Adjust the MR duty
   - Adjust the driving frequency and motor control (including Focus preset adjustment)

2. Equipment and tools to be required
   - Single output rated voltage power supply: 1 unit (6.0V 3.0A)
   - Oscilloscope: 1 unit For adjusting the MR duty, the driving frequency and motor control △ (Addition), Inspection of Lens Driving Time
   - AF-I communication box (J15306-1): 1 unit
   - AF-I communication adapter (J15307): 1 unit

● When the main PCB is replaced, be sure to perform ~~"3. READING AND REWRITING OF EEPROM DATA" then "3. WRITING OF THE FIXED VALUES"~~. △ (Revision) [8. Writing of EEP-ROM Fixed Values]

AF-S 55-200 inspection and adjustment program (J18386)

The below hardware requirements are necessary for installing the program on a computer.
Ensure them before installation.

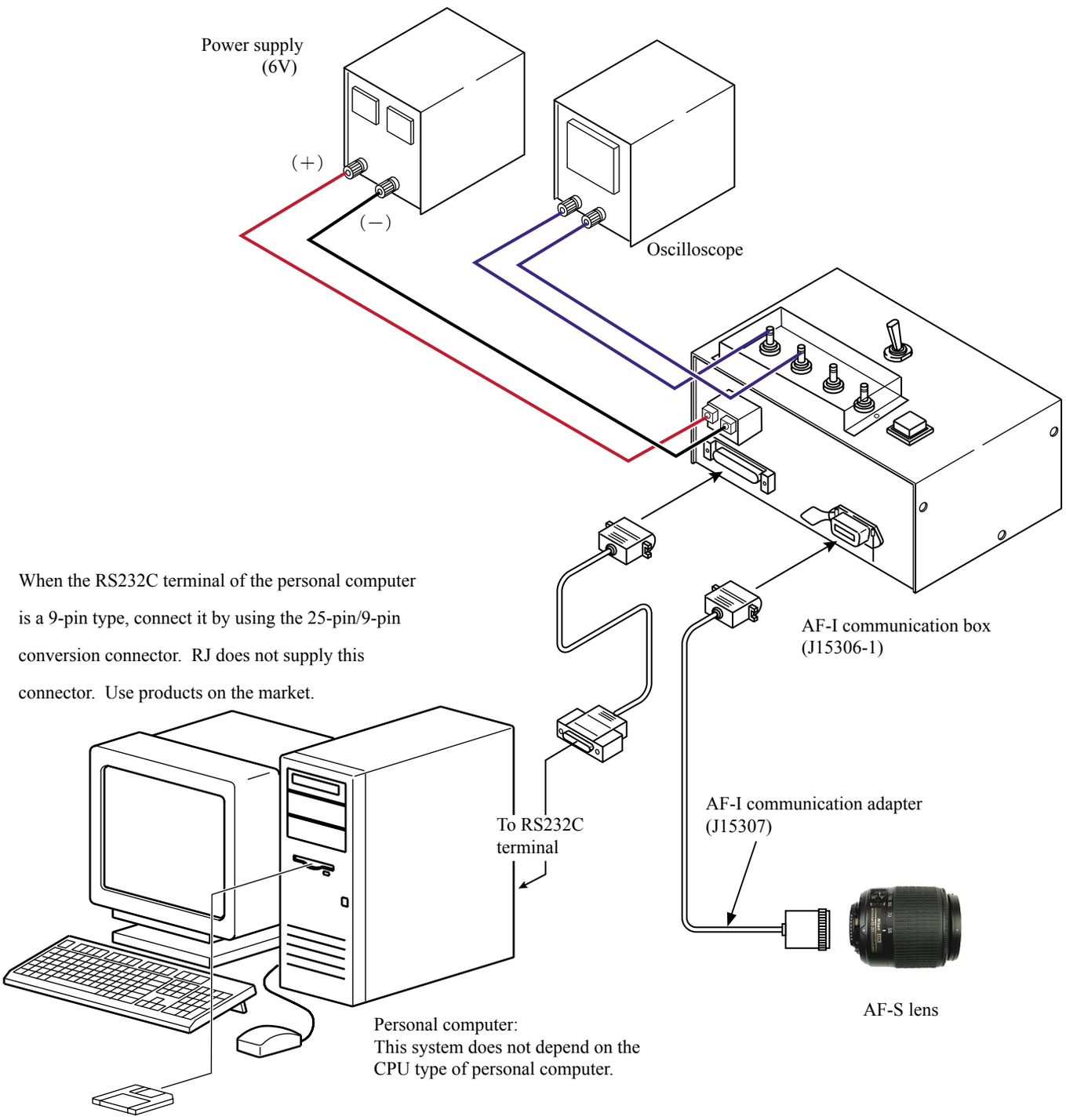
PC	IBM PC/AT compatible
OS	Windows XP Home Edition, Windows XP Professional, Windows 2000, △ (Deletion) ~~Windows Millennium Edition (Me), Windows 98 Second Edition (SE), Windows 98,~~
CPU	Pentium Ⅱ 266MHz ～ Pentium Ⅳ 2GHz
RAM (Memory)	32MB or more
HD	6 MB-or-more free space is necessary when installation
Monitor resolution	800×600 or more pixels
Interface	Serial interface ※ USB interface cannot be used.

As long as the above requirements are met, either desktop or notebook PC is available.

サービス計画課 M

【System configuration】

★ : NEWTOOL



★ AF-S 55-200
Inspection and adjustment software (J18386)

Adjustment of MR duty

●In case of replacing the main PCB, SWM unit and MR encoder unit, be sure to make adjustments.
●In case of replacing the main PCB, be sure to perform ~~[READING AND REWRITING OF EEPROM DATA.] then [3.WRITING THE FIXED VALUES.]~~ △ (Revision) [8. Writing of EEP-ROM Fixed Values]

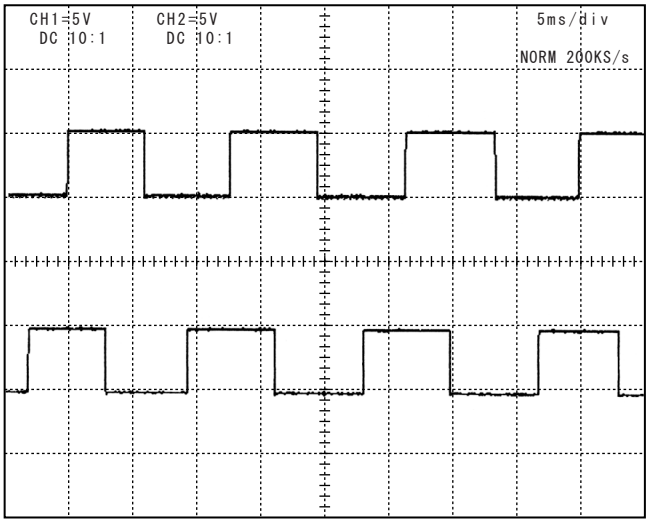
How to adjust

① Make sure that the electric current and voltage of the connected rated voltage power supply are set to the set values, which are instructed on the PC screen. Then, turn the rated voltage power supply ON.

② Select ~~"1. MR DUTY ADJUSTMENT"~~ in the menu of the AF-S DX55-200 inspection program.
△ (Revision) [1. Adjustment for Electrical Device] → [Adjustment for MR-duty (Adjustment 1 of 2)]

③ The confirmation screen for writing the fixed values in EEPROM appears. Select the appropriate item.

④ Following the instruction on the screen, rotate the MF ring slowly by hand in the direction from the infinity to the close distance position. Make sure that the waveform on the oscilloscope has duty 50% and stop the MF ring at the close distance-end.



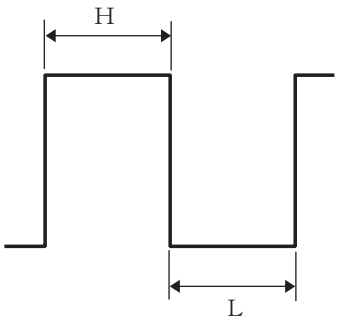
● Setting of oscilloscope

V/Div (CH1)	: 5V
V/Div (CH2)	: 5V
Coupling	: DC
Time/Div	: 5 m Sec
Trigger Mode	: NORMAL
Trigger Coupling	: DC
Trigger Source	: CH 1
Trigger Position	: +4 div
Trigger Type	: EDGE
Trigger Level	: 2.5 V

⑤ Following the instruction on the screen, rotate the MF ring slowly by hand in the direction from the close distance to the infinity position. Make sure that the waveform on the oscilloscope has duty 50% and stop the MF ring at the infinity-end.

Note : In case the waveform from infinity to close distance position or vice versa does not have duty 50%, repeat "INSPECTION AND ADJUSTMENT OF THE MR ENCODER OUTPUT WAVEFORM" on Page A7.

Standard H : L = 100 : 150 ～ 150 : 100 (50% ±10.0%)



サービス計画課 M

Adjustment of Driving frequency and Motor control

● In case of replacing the main PCB, SWM unit and MR encoder unit, be sure to make adjustments.

① The method of connection of the rated voltage power supply and measuring tools is the same as "ADJUSTMENT OF MR DUTY".

② Make sure that the electric current and voltage of the rated voltage power supply are set to the set values on the PC screen.

③ Turn the rated voltage power supply ON.

④ Select ~~"2. ADJUSTMENT FOR DRIVING FREQUENCY & MOTOR CONTROL"~~ in the menu of the AF-S DX55-200 inspection program. The lens automatically starts the driving of scanning.

△ (Revision) [1. Adjustment for Electrical Device] → [Adjustment for Frequency and Control (Adj. 2 of 2)]

△ (Revision)

Fig.1

△ (Revision)

⑤ When the above screen appears, select "Adjustment for Electrical Device" to make adjustments.
In case the adjustment is not successful in spite of the above Fig.1, the SWM unit, focus gear ring unit, or MR sensor unit may be defective.

サービス計画課 M

Inspection of Lens operations

Check the lens operations by using a personal computer after assembling.

○ Check by personal computer

● Check by the following considerations:

1. MR encoder operations

・Drive the scanning of lens and check the total number of pulses.

・In case the MR head of the MR encoder and the magnetic tape are misaligned, the number of pulses becomes out of standard.

2. Lens-servo stop accuracy

・Check the number of overrun/underrun pulses (deviation of the stop position from the target position) per the specified lens driving.

・In case the irregularity of mechanical operations does not take place in the focus ring driving unit, the underrun tends to occur if it is heavy in the cam ring rotation of the MR encoder, while the overrun tends to occur if it is light in its rotation of the MR encoder.

3. Lens-servo time

・Check the servo time (from starting and stopping the servo) when driving the specified lens by using the oscilloscope.

・In case the irregularity of mechanical operations does not take place in the focus ring driving unit, the servo-time tends to be long if it is heavy in the cam ring rotation of the MR encoder, while the servo-time tends to be short if it is light in its rotation of the MR encoder.

4. Switches and lenses

・Check the ON/OFF operations of switches and the operating condition of the distance encoder.

● After inspections

1. When the MR encoder operations are not up to the standard:
   Readjust the MR duty. (ref. Page A37.)
   In case the pulse is not up to the standard, adjust the output waveform of the MR encoder again. (ref. Page A7.)
   In case the pulse meets the standard, replace the cam ring unit.

2. When the lens-servo stop accuracy is not up to the standard:
   Check the output waveform of the MR encoder. If it is normal, replace the fix-tube unit.

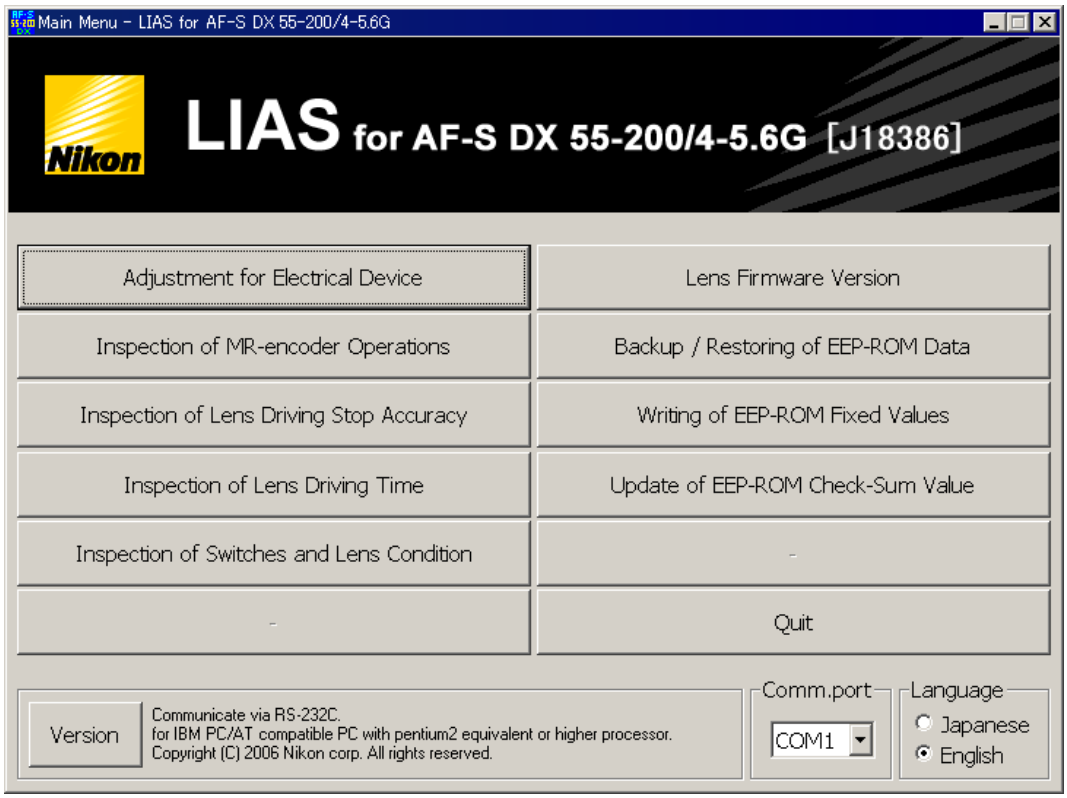
3. When the lens-servo time is not up to the standard:
   Readjust the driving frequency and motor control.
   In case the lens-servo time is not up to the standard even after the readjustment, replace the fix-tube unit.

4. When switches do not work properly:
   Check the wiring state of the troubled switch or replace it.

●AF-S DX55-200/4-5.6G inspection program

(1) Menu screen

△ (Revision)



・Menu items

The item 1 ~~and 2~~ is used for adjustment.

△ (Deletion)

The items ~~3~~ are used for reading and writing EEPROM DATA.

△ (Revision) 7~9

The items ~~4~~~7 are used for inspections.

△ (Revision) 2~5

・Selection items

After selecting items screens appear, such as the lens selection, the focal length selection, the voltage setting, the inspection mode start.

The screens depend on the items. Follow the instructions of the personal computer.

△ (Deletion)

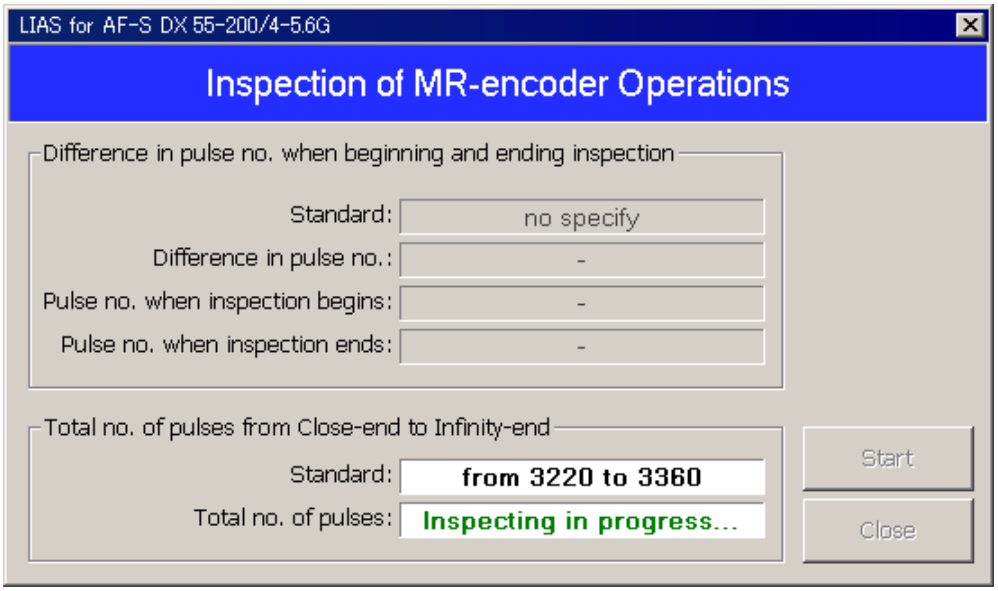
~~・Initial driving~~

~~Drive scanning several times and stop at infinity-end.~~

サービス計画課 M

(2) Inspection of MR encoder operations

△ (Revision)



Caution : If the MF ring is rotated while the lens scanning is driven, the pulse shows an abnormal value.
Do NOT touch the MF ring during operations.
~~Make inspections at the 5 positions as below.~~
△ (Deletion)

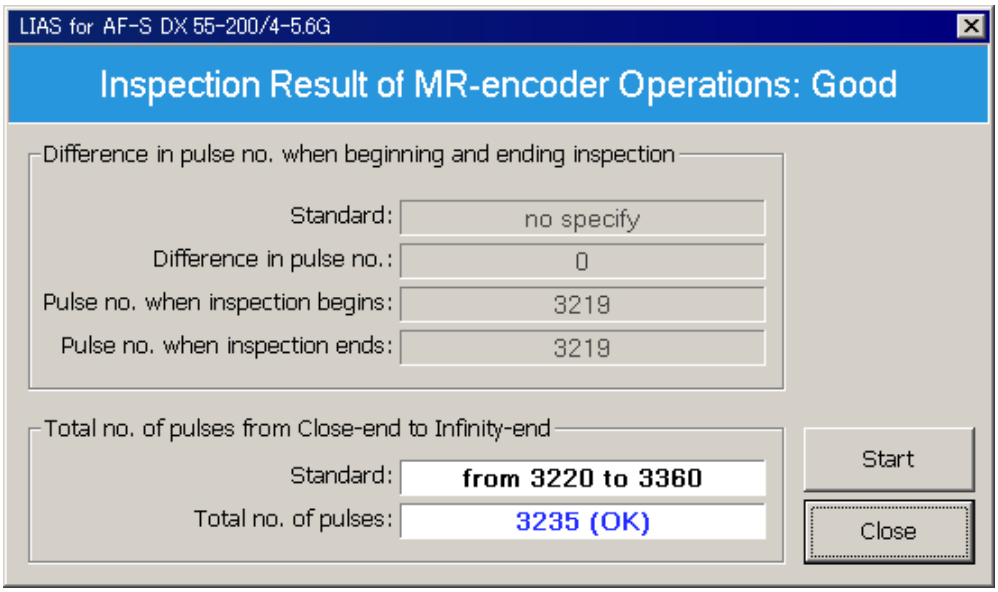
When the inspection ends, the result appears on the next page.

サービス計画課 M

The difference in pulse before and after the inspection must be within the standard.

< Standard > Total pulses : 3290 ± 70 PULSE(S)

△ (Revision)



サービス計画課 M

(3) Inspection of lens-servo stop accuracy

① ~~Make this inspection on both focal length 55mm (W) and 200mm (T).~~
△ (Revision)
This inspection must be made at the following 5 lens positions with the focal length [both 55 mm (W) and 200 mm (T)].

△ (Addition) (Lens position in inspecting)

Lens inclination	Position of index window
Horizontal	Up, right and left
Front lens group 60° angle upward	
Front lens group 60° angle downward	

△ (Revision)
② If the lens stops while inspecting the lens-servo stop accuracy, input a figure in "Delay time" of the below "Fig.2", from "0" to "1000" for the delay time (msec: millisecond) which prevents stopping the lens.

Note:
△ (Deletion)
The value of "~~ADUST~~ DELAY-TIME" is set by the adjustment software. So, if the lens does not stop during the inspection of "LENS DRIVING STOP ACCURACY", any value can be input without problem.
△ (Deletion)
However, the larger the value of "~~ADJUST~~ DELAY-TIME" gets, the longer the inspection time becomes.

△ (Revision)

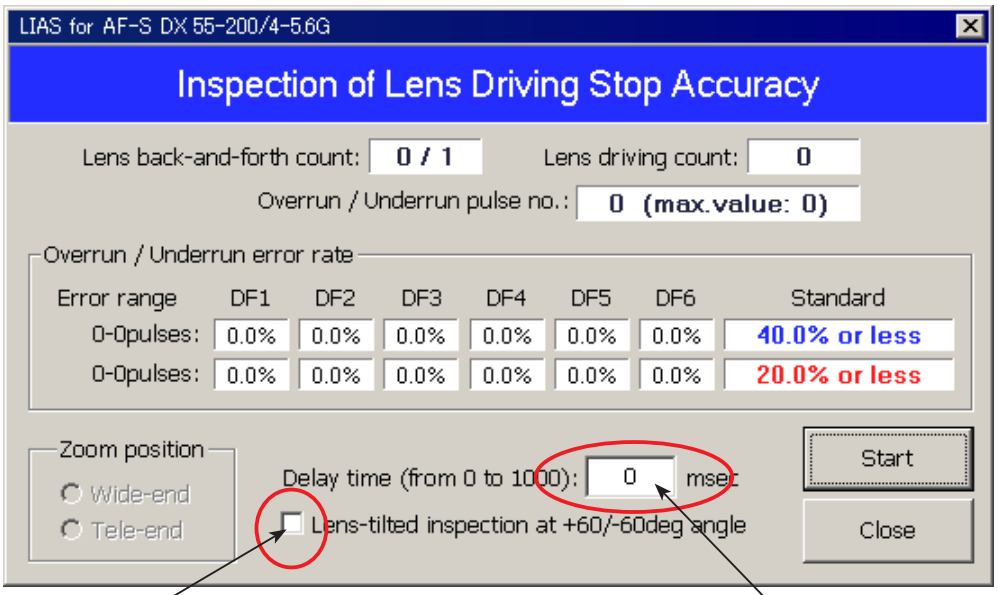


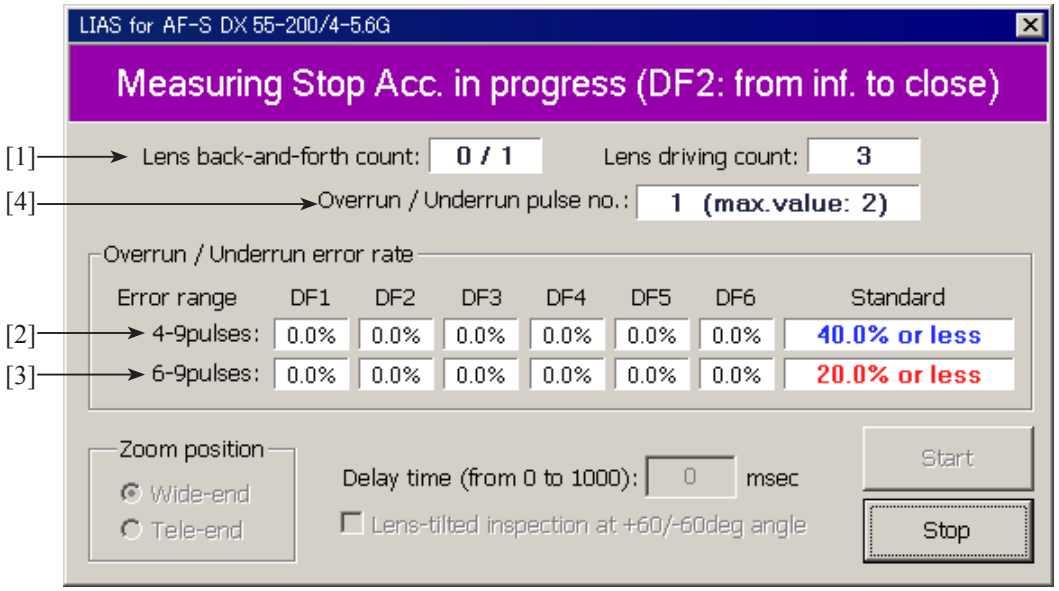
Fig.2

△ (Addition)
Tick the checkbox, when the front lens-G is tilted at 60°angle upward or downward.

△ (Addition)
Input box

サービス計画課 M

△ (Revision)



Caution : If the MF ring is rotated while the lens scanning is driven, the pulse shows an abnormal value. Do NOT touch the MF ring during operations.
During the lens driving, the above screen is displayed.

The number of overrun/underrun pulses must be within the standards after the lens back-and forth driving 1-motion ("1/1TIME (S)." in [1] of the display).

Standard

△ (Deletion)
~~RATIO (1) is~~ 40% or less for Df1~Df6. [2]of the screen
[Occurrence ratio of 4-9 pulses]

△ (Deletion)
~~RATIO (2) is~~ 10% or less for Df1~Df6. [3]of the screen
[Occurrence ratio of 6-9 pulses]

Occurrence of 10 or more pulses is zero for Df1~Df6. △ (Deletion) [4]~~and[5]~~of the screen
[Only one occurrence indicates malfunction.]

※ "Df1~Df6" shows the lens driving amount.

サービス計画課 M

(4) Inspection of lens-servo time

~~Make this inspection on both focal length 55mm (W) and 200mm (T).~~

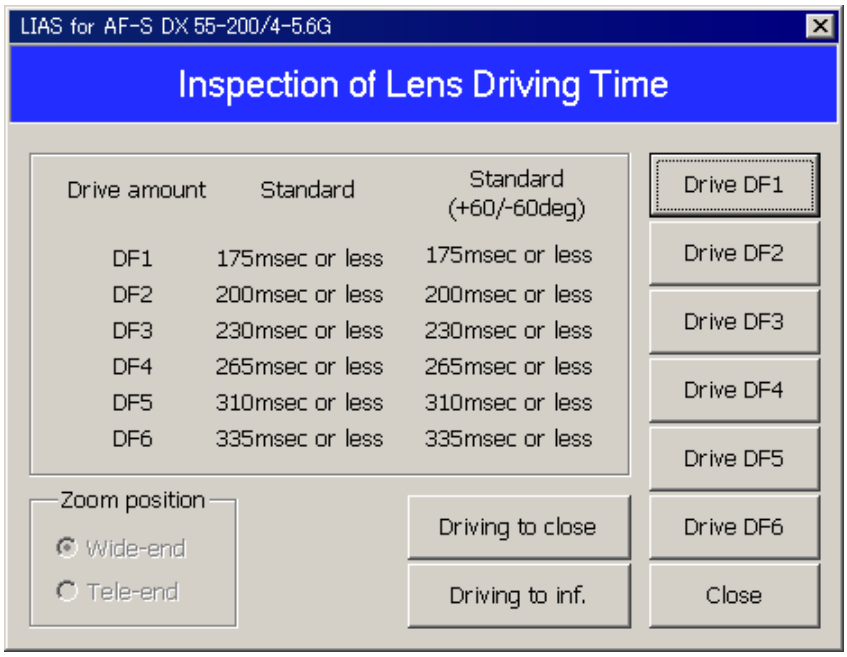
△ (Revision)

This inspection must be made at the following 5 lens positions with the focal length [both 55 mm (W) and 200 mm (T)].

△ (Addition) (Lens position in inspecting)

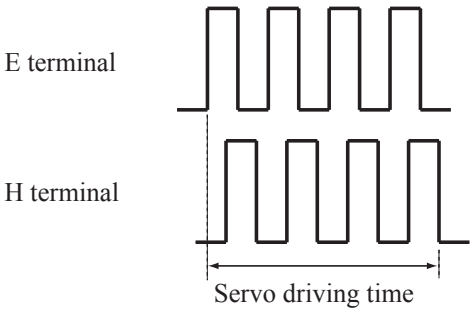
Lens inclination	Position of index window
Horizontal	Up, right and left
Front lens group 60° angle upward	
Front lens group 60° angle downward	

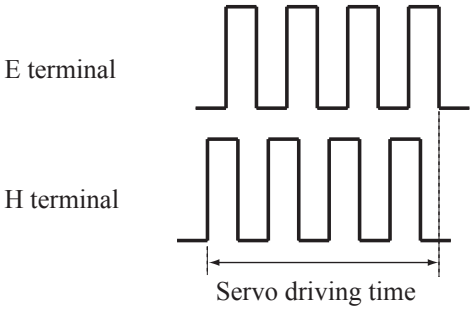
△ (Revision)



Select the servo driving amount respectively. Each lens-servo drive time must be within the standard.

Caution : If the MF ring is rotated during inspections, the waveform shows an abnormal value. Do NOT touch the MF ring during inspections.





●Oscilloscope setting

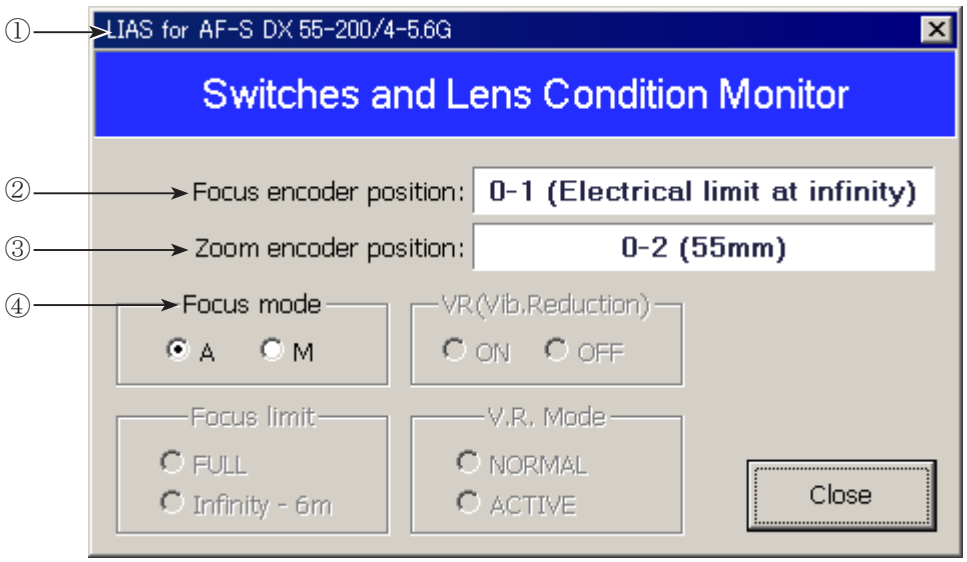
V/Div	: 5V
Coupling	: DC
Time/Div	: 20 m Sec
Trigger Mode	: SGL (S)
Trigger Coupling	: DC
Trigger Source	: CH1

※ The waveforms of E and H terminals have the forms for going up for start and going down for start.

サービス計画課 M

(5) Inspection of switches and lens conditions

△ (Revision)



① Type of lens

△ (Deletion) ~~② Version of CPU in the lens~~

△ (Revision) ② ~~③~~ Signals of the distance encoder

Value changes by turning the MF ring with “M or M/A” of the lens driving mode selector.

△ (Revision) ③ ~~④~~ Signals of the zoom encoder

(Value changes by turning the zoom ring)

~~⑤ Status of lens driving mode selector SW~~

△ (Revision) ④ A-M mode switch

サービス計画課 M

Necessary adjustment when replacing parts

Adjustments / Parts to be replaced	Adjustment for MR duty △ (Addition) (Necessary to write fixed value when the main PCB is replaced.); driving frequency; motor control	Inspection & adjustment for MR encoder operations; lens-servo stop accuracy; lens-servo time; switches; lens condition
Main PCB unit	○	○
SWM unit	○	○
MR sensor	○	○
Focus gear ring unit	○	○

サービス計画課 M

Aberration compensation data writing adjustment

・ This adjustment uses the software which calculates the aberration compensation data according to the feature of lens aberration and writes in EEPROM of the lens, in order to improve the accuracy of autofocus.

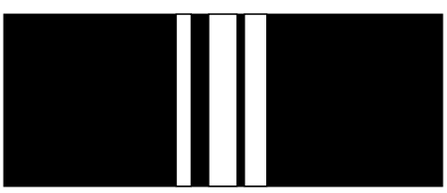
Note: This adjustment is necessary when the main PCB and/or each lens part (glass, lens chamber) is replaced or when each lens part is disassembled. Be sure to make this adjustment after completing inspecting and adjusting the main PCB.

(1) Preparation

- Test chart (Self-made tool: ref. Procedure for how to create it.)
- Tripod
- D100
- Personal computer
- USB cable（UC-E4）
- Adjustment software (LWM.exe：used for the lens optical alignment.)

(2) Procedure for how to create Test chart

- Photocopy the next page and cut out 1 target chart and 5 resolution charts.

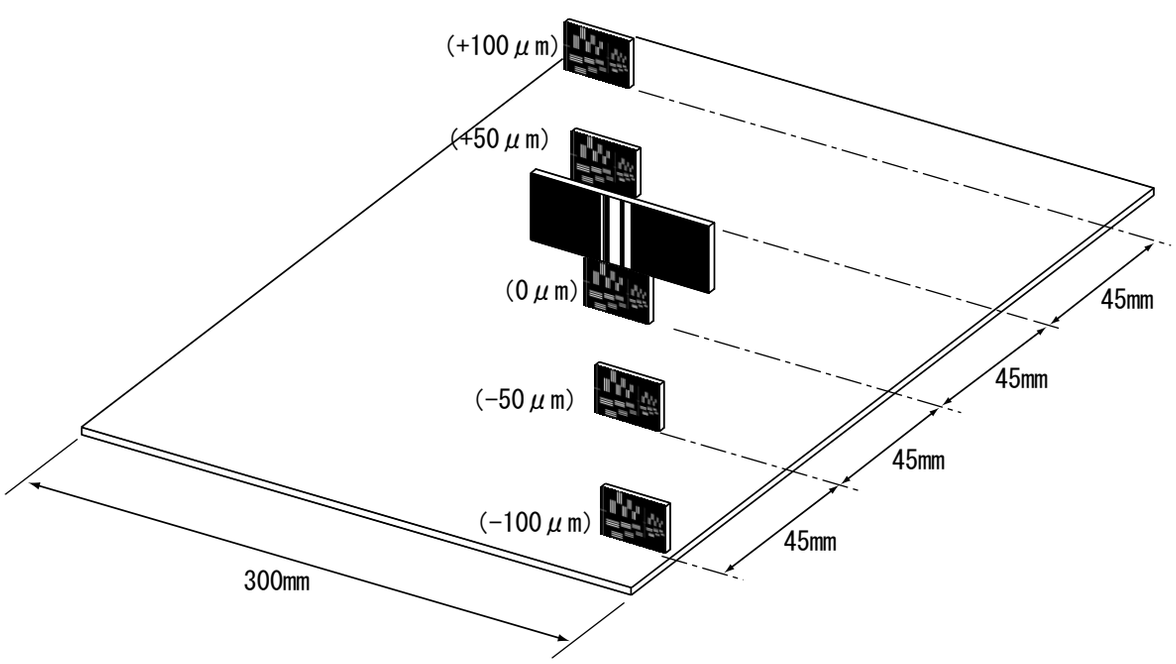


(Target chart)

(Resolution chart)

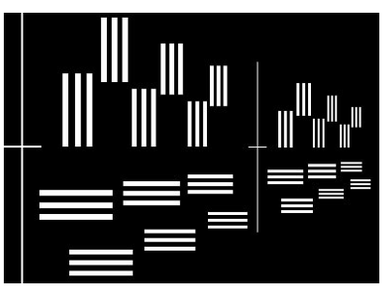
- As shown below, put each chart in position at the specified spacings.

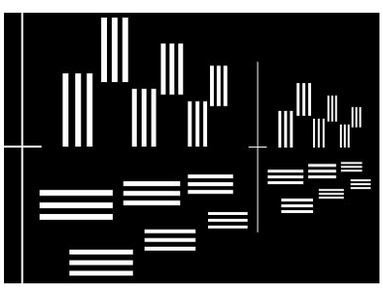
  Note: Only about the center, put the target chart on the central resolution chart.

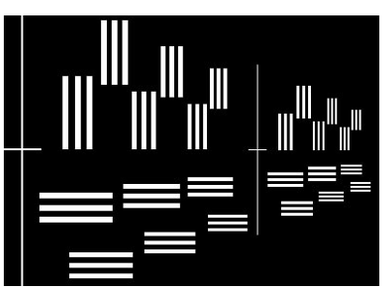


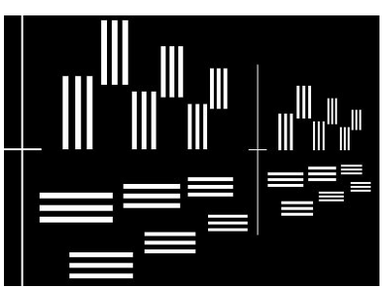
(Target chart)

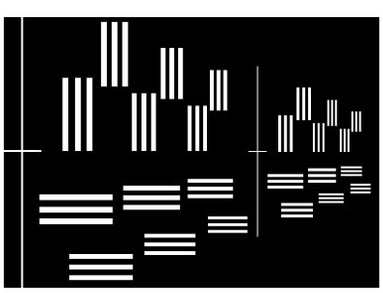
(Resolution chart)







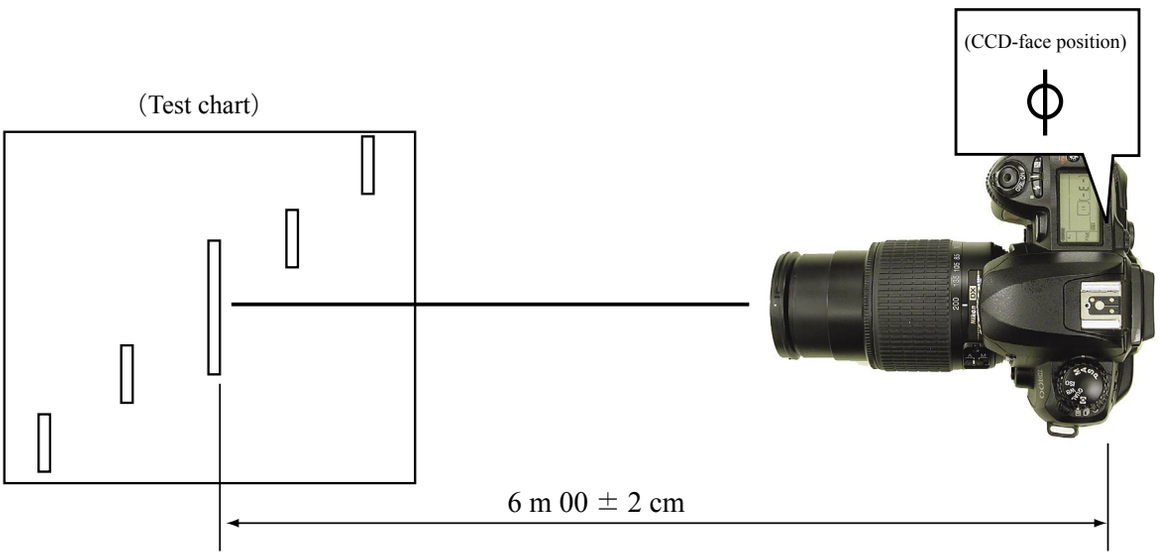




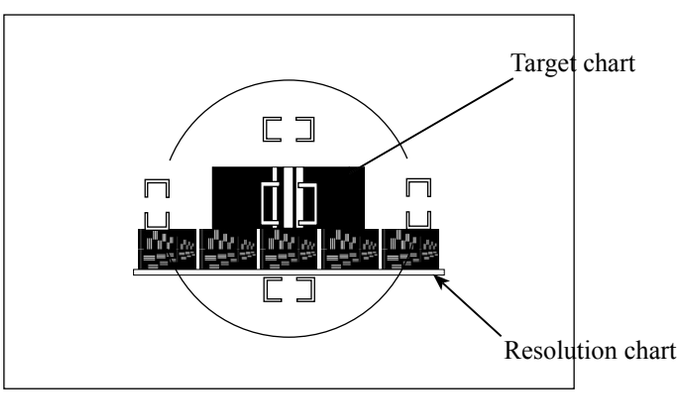
(3) Writing aberration compensation data

① Prepare a camera (D100). Set the "Exposure mode" to "A" for full aperture and "Focus mode" to "S". On the shooting menu, set the "Image quality mode" to "FINE", "Image size" to"L", "WB" to "Preset", and "ISO" to "200".

② Set up the camera (D100), in which the lens to be inspected is fit, on the tripod. Set the focal length to 200 mm, and the distance between the test chart and camera (CCD face) to 6 m 00±2 cm.



③ As shown below, bring the target chart in the center of focus area within viewfinder.

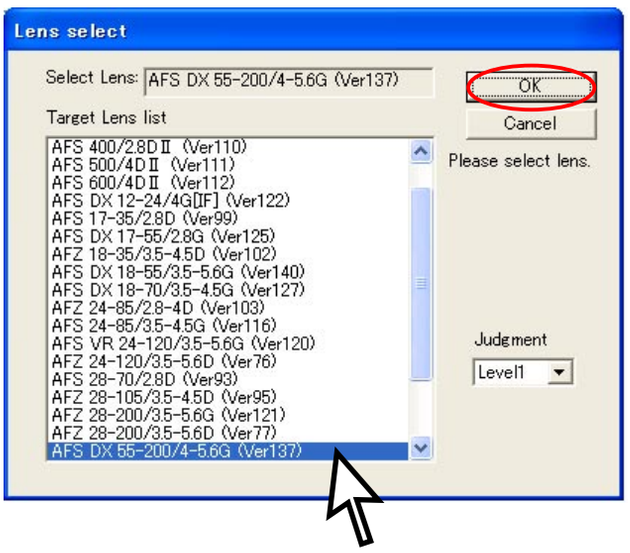


(Within viewfinder)

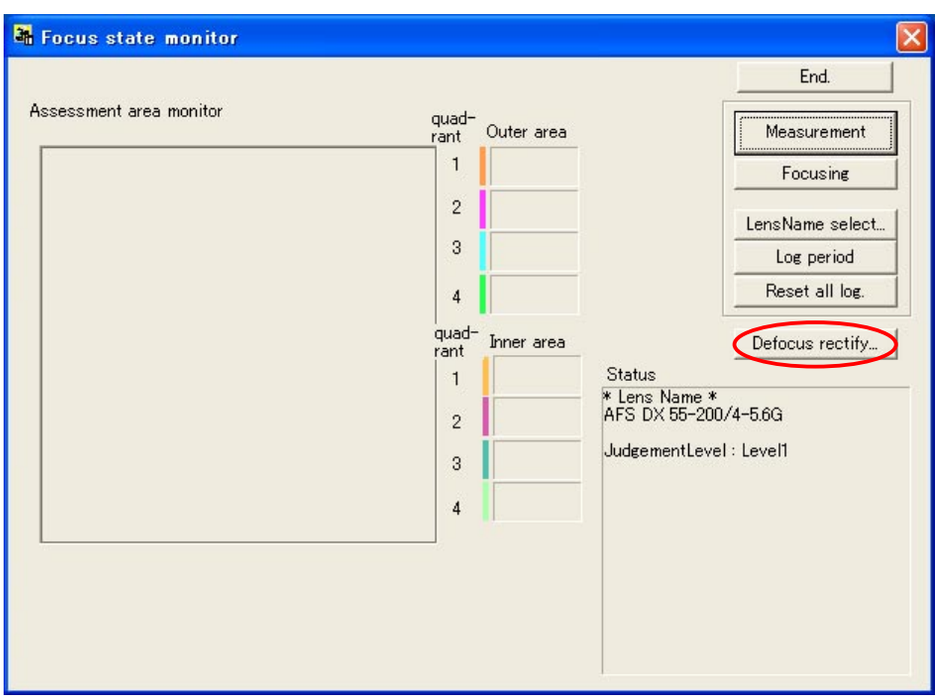
④ Connect the PC and camera via USB cable. (Camera setting: Mass storage)

⑤ Start the adjustment software (LWM.exe).

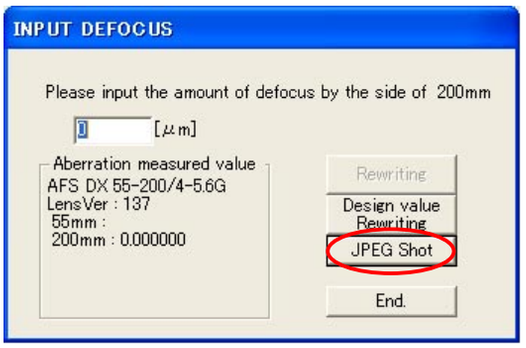
⑥ Select "AF-S DX55-200/4-5.6G" from "Target lens list", and click "OK" button.



⑦ Click the "Defocus rectify..." button.

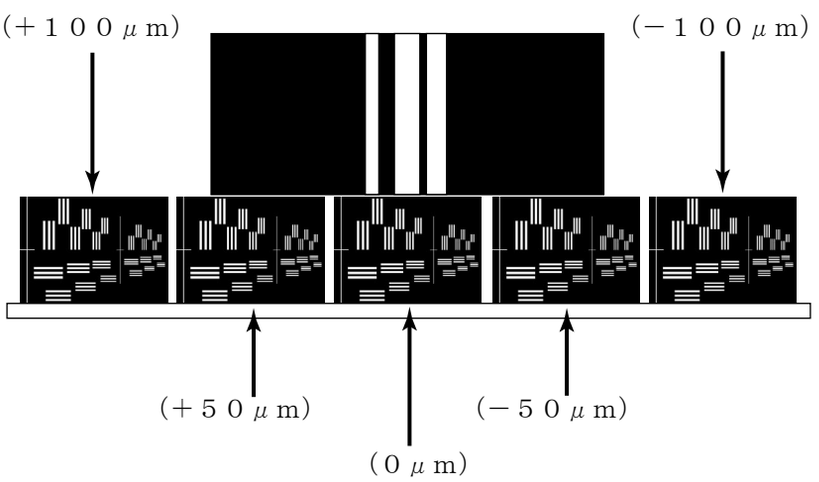


⑧ Click the "JPEG Shot" button.



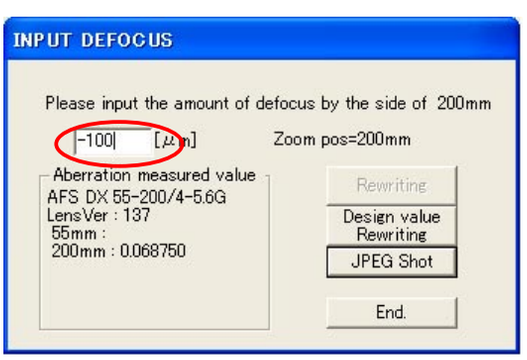
⑨ The shutter is released after the AF operation. The shot image is automatically displayed on the PC screen. Scale the image to 100% and check which chart is in focus of the 5 resolution charts.

Note: As for this lens, even if the aperture is fully open, the depth of field is so deep that when looking for the center of focus, compare 2 charts between which there are 2 or more charts.



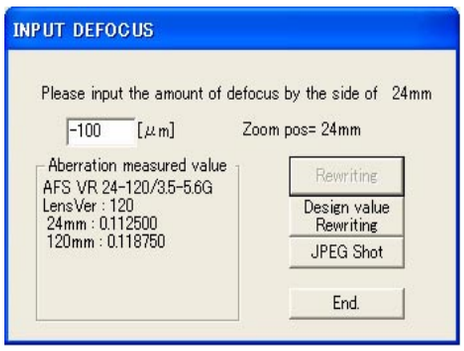
⑩ Input the value of the focused position into the entry field.

e.g. The below is the case when "−100μm" of the front focus side is in focus.

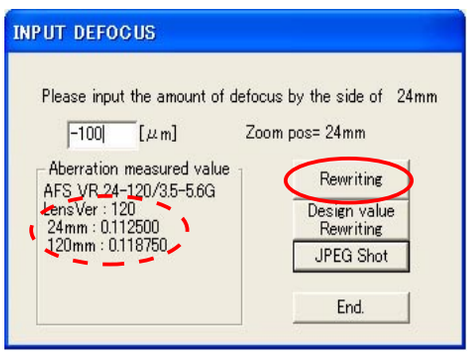


⑪ Set the focal length of the lens to 55 mm, and the distance between the test chart and camera (CCD face) to 2m20 ± 2 cm.

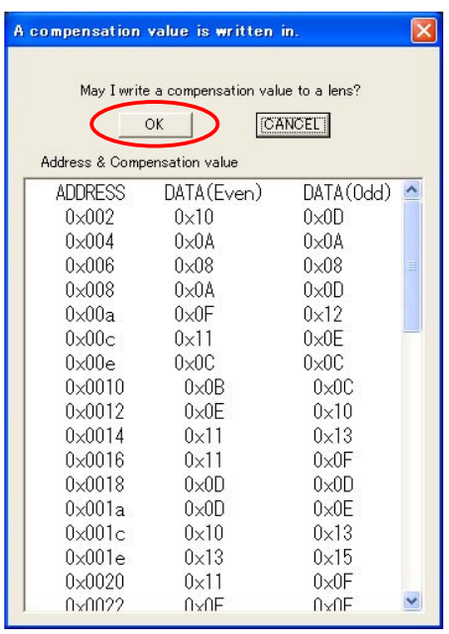
⑫ Perform the operations from ⑧ to ⑩ of the previous page.



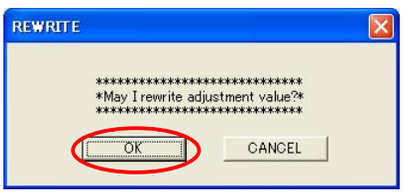
⑬ Check that the values of all the focal lengths are displayed within the dotted red circle. Then click on "Rewriting".



⑭ When "A compensation value is written in." is displayed, click "OK".



⑮ The reconfirmation screen is displayed. Click "OK".

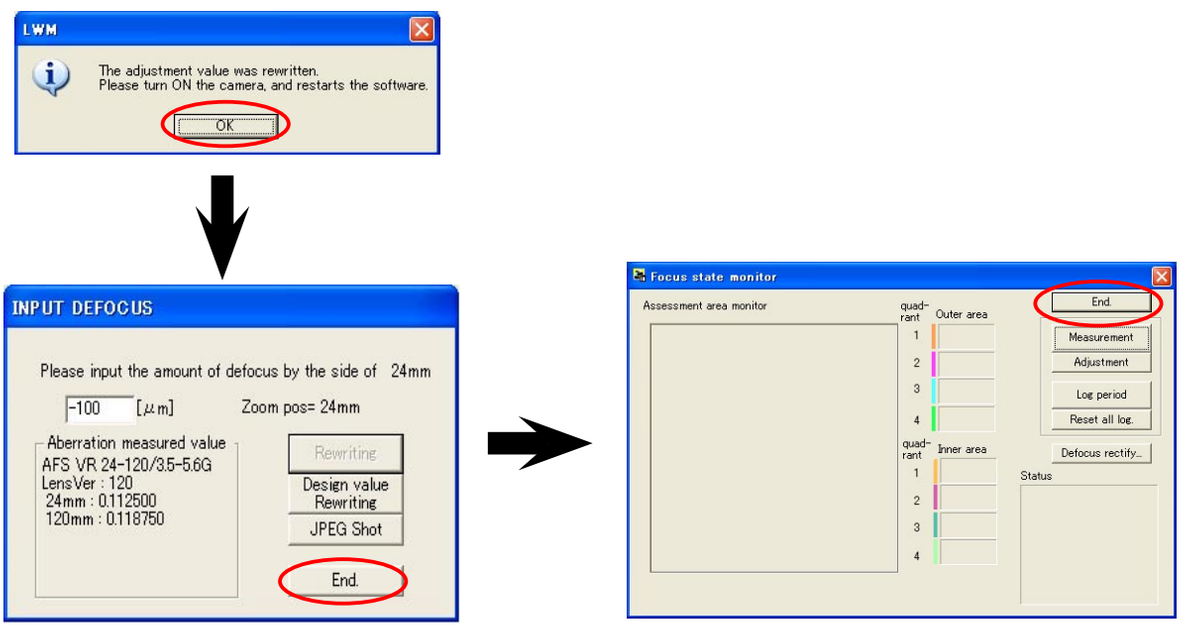


⑯ An hourglass is displayed on the screen, and writing starts.

The below screen is displayed after a few seconds. Turn camera OFF and turn it ON again.

Click "OK", and the adjustment software restarts.

Note: Unless the camera is turned off once, the value that was written in EEPROM is not reflected.

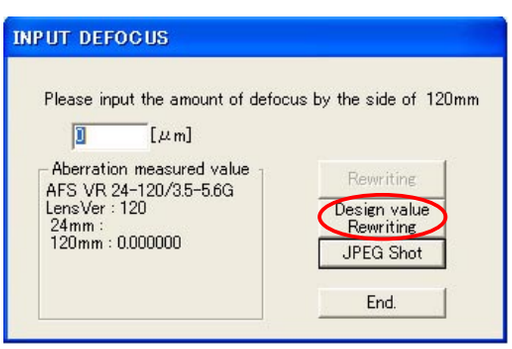


⑰ When the adjustment software restarts, perform the operations from ② to ⑫ again. Check that "0μm" of the AF position is in focus.

(It is also possible, after Wide-side shooting of ⑪, to take the Tele-side shooting of ②.)

If "0μm" is not in focus, repeat the operations from ② to ⑰.

If it is not still in focus even after repetition, the written value in EEPROM may be abnormal. So click "Design value Rewriting" to write the initial value, then proceed with the operations.



Resolusion inspection

At repair/service facilities where there is no projector, check the resolution by shooting the high-definition resolution chart.

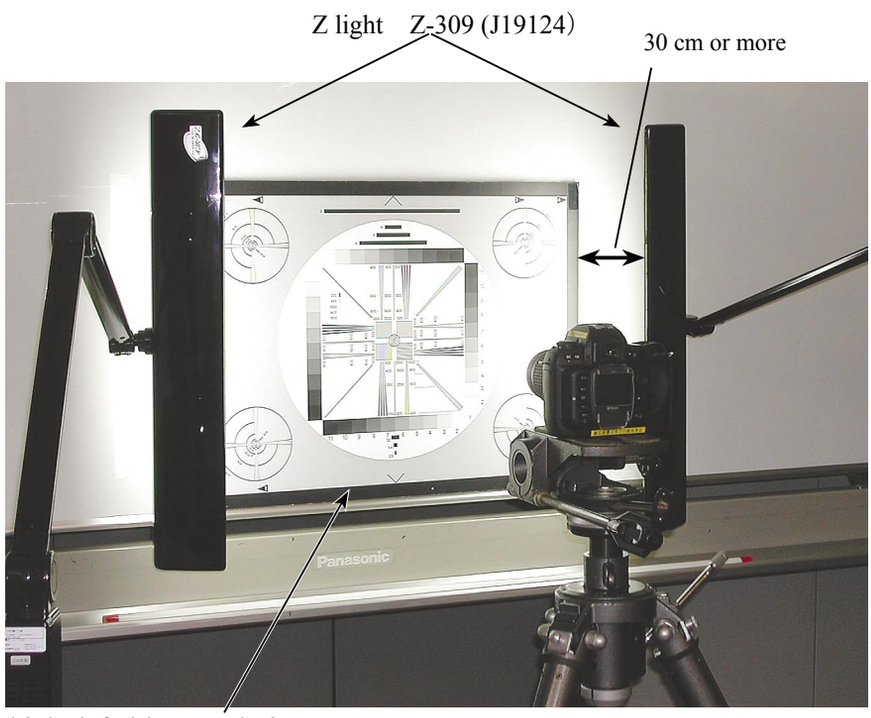
1. Check the resolution

By shooting the high-definition resolution chart (J63079), confirm that the TV lines are within the standard.

Standard for the TV lines:
WIDE (55 mm): 1200 or more TV lines in the center ; 1200 or more TV lines on the periphery /4 corners
TELE (200 mm): 1000 or more TV lines in the center ; 1000 or more TV lines on the periphery /4 corners
(ref. The unit of resolution is based on TV lines, which are total number of black-and-white strips distinguishable on the TV screen.)
Device: D100 camera, ITE high resolution chart (J63079), flicker-less fluorescent (AAA)
(a) Camera settings: Aperture-Priority Auto (A), Shooting-mode (P), Image quality mode (FINE), Image size (FULL), ISO (200), Image sharpening (None), Tone compensation (Normal)
Reset other settings (e.g. compensation) and shoot pictures.
(b) To avoid light irregularity on the chart, for either 2 units of Z light (Z-309)(J19124) or 2 units of 15W inverter-type fluorescent stand, use fluorescent lamp color-rendering AAA (J19124A). Set them so that reflected light does not directly come in shot images.

As for exposure, open the shot images via PHOTOSHOP, and make an exposure compensation so that the value of RGV becomes 219±10 LSB, when the cursor comes to white parts of the images.

(ref. : Set the exposure compensation to about +1-step for becoming 219±10 LSB.)

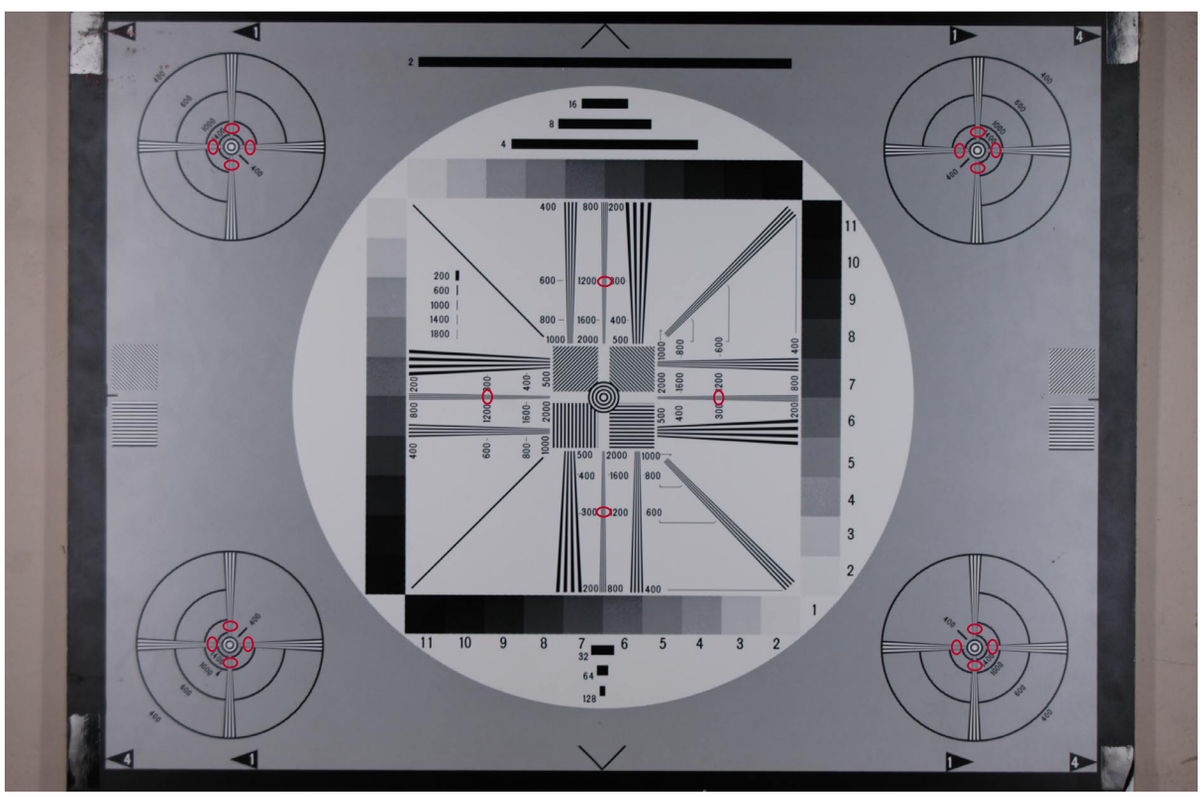


Pic.1

(c) Check the zoom position at WIDE and TELE.
The object distance: WIDE (approx.1.8m), and TELE (approx.5.4m). Set the chart fully screened in the LCD of the camera and fix it on a tripod.
Because horizontal-to-vertical/aspect ratio is different between the chart and the finder field frame, align with the vertical direction (ref. Pic.1)

(d) Open the shot image by Photoshop, and confirm it by the magnified display, e.g. 100%, etc.

(e) Check if the resolution in the center and the 4 corners is identifiable in black and white at the position circled in red as below.
(Refer to the next page for sample of defective image.)



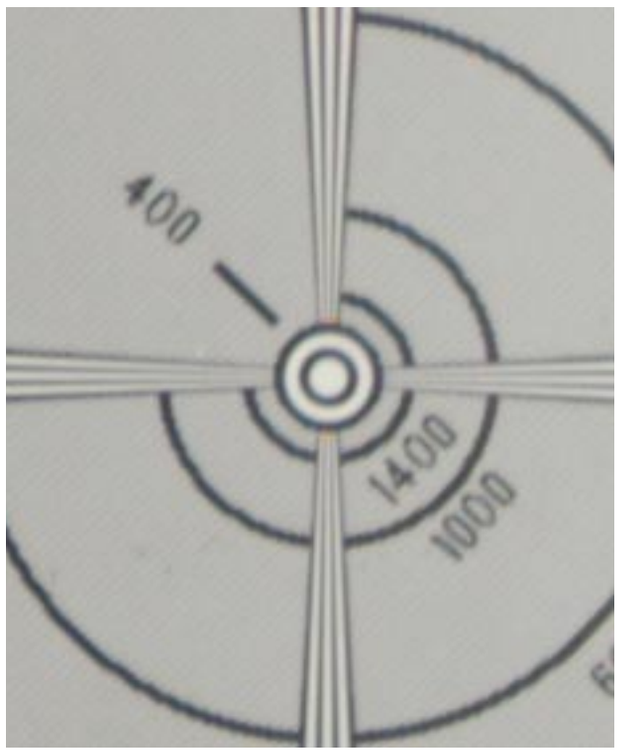
Pic.1

2. Sample image: for judging the chart (on the periphery)

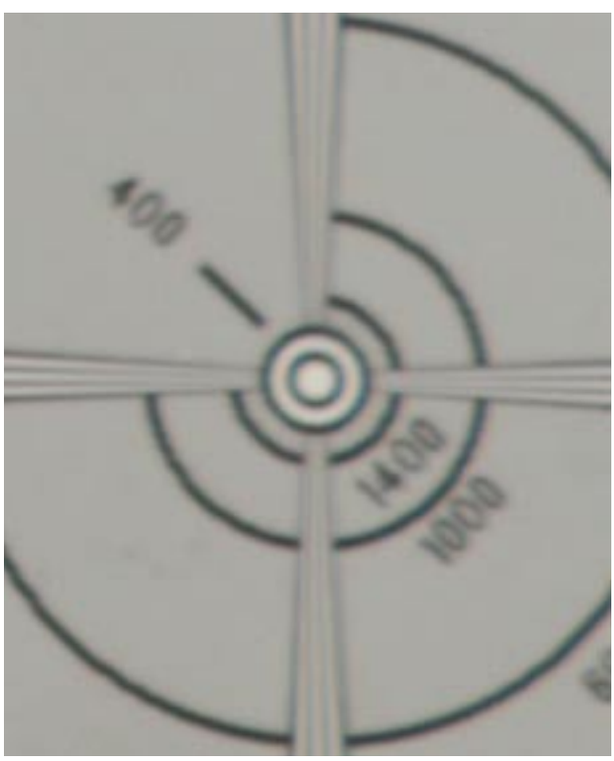
Shoot pictures of the chart. In case TV lines of the center become less than 1200 (WIDE) and less than 1000 (TELE), or any of the periphery/4 corners shows the following image of defective samples [less than 1200 (WIDE) and less than 1000 (TELE) TV lines], check that there is no damage to each part by shock, etc, and then perform the lens alignment again on Page A14.

Note: For the judgment, the defective image sample should be prioritized over the number of TVlines.

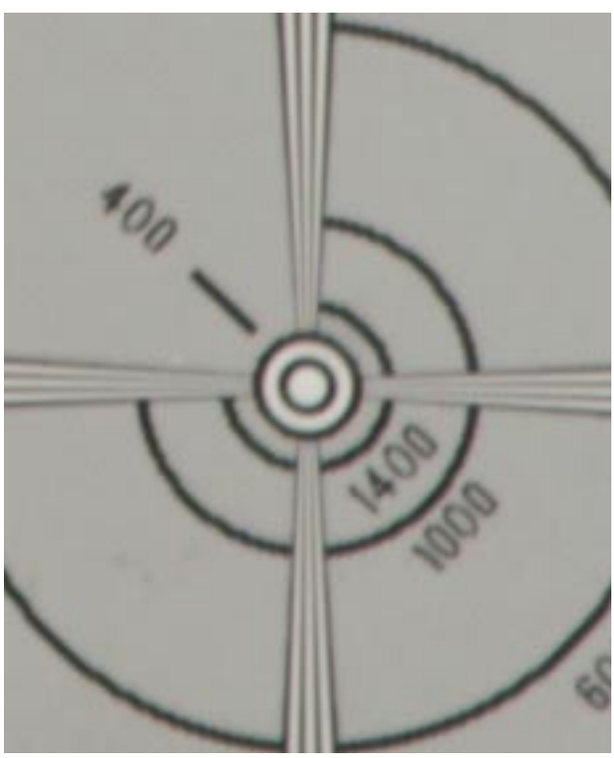
Defective at WIDE side



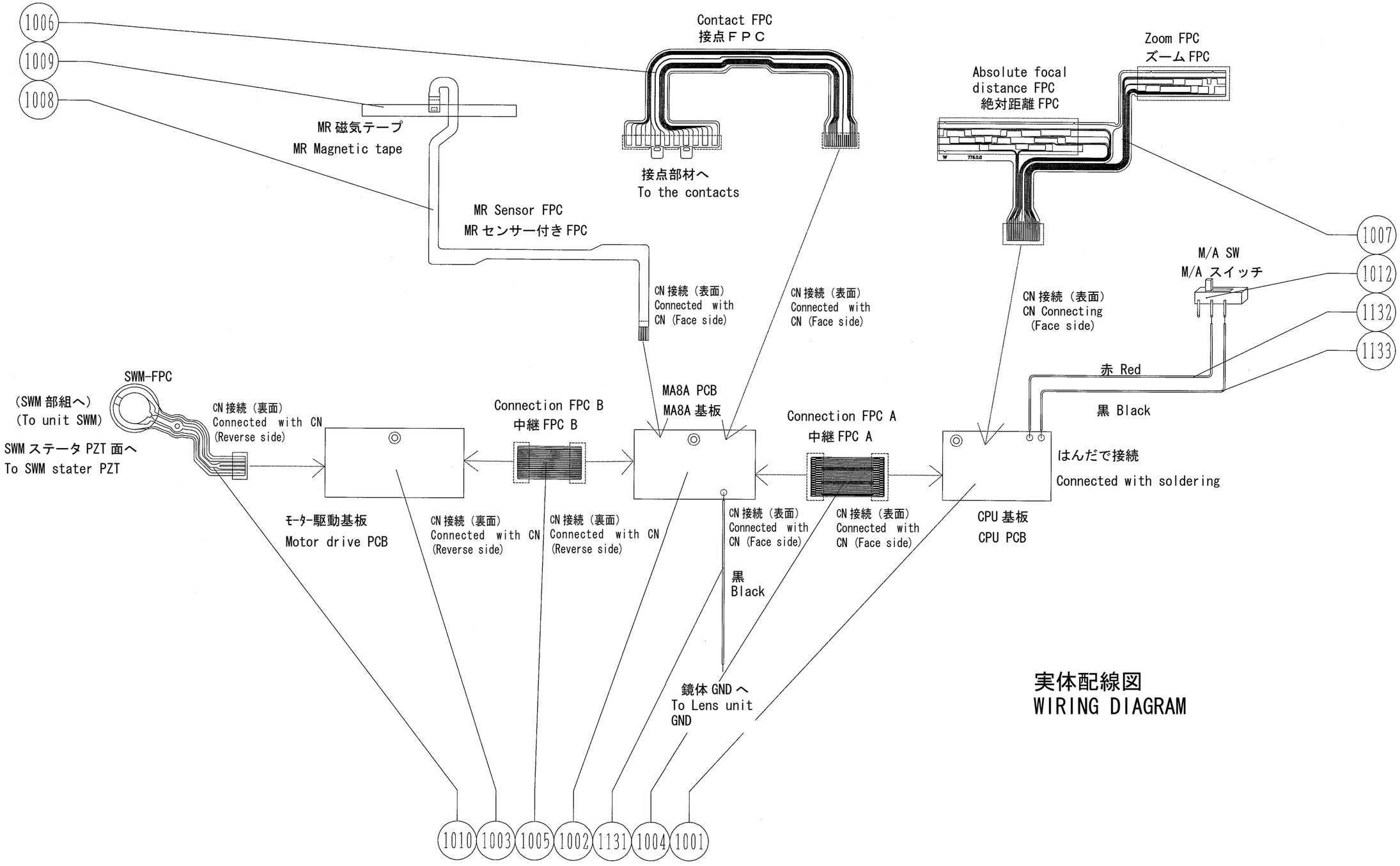
NON-defective at WIDE side



Defective at TELE side

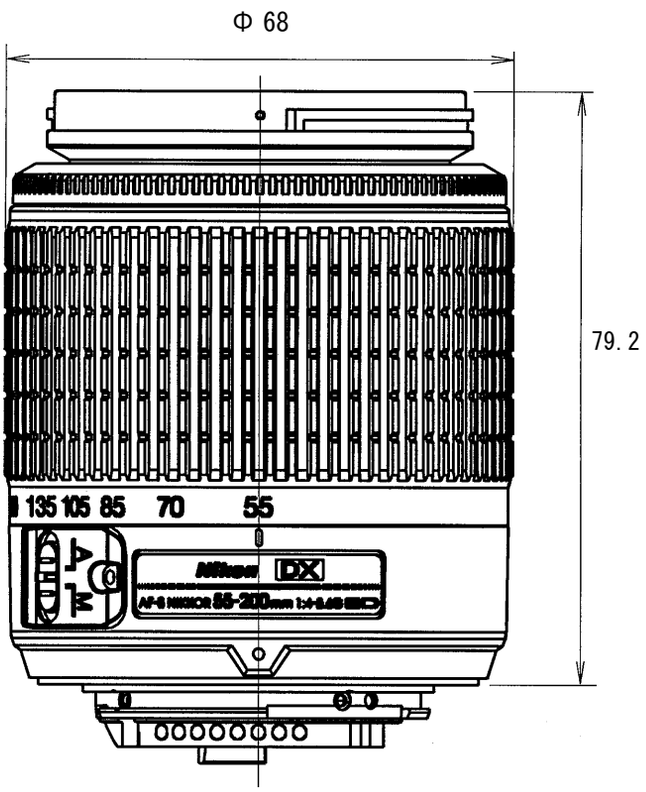


NON-defective at TELE side

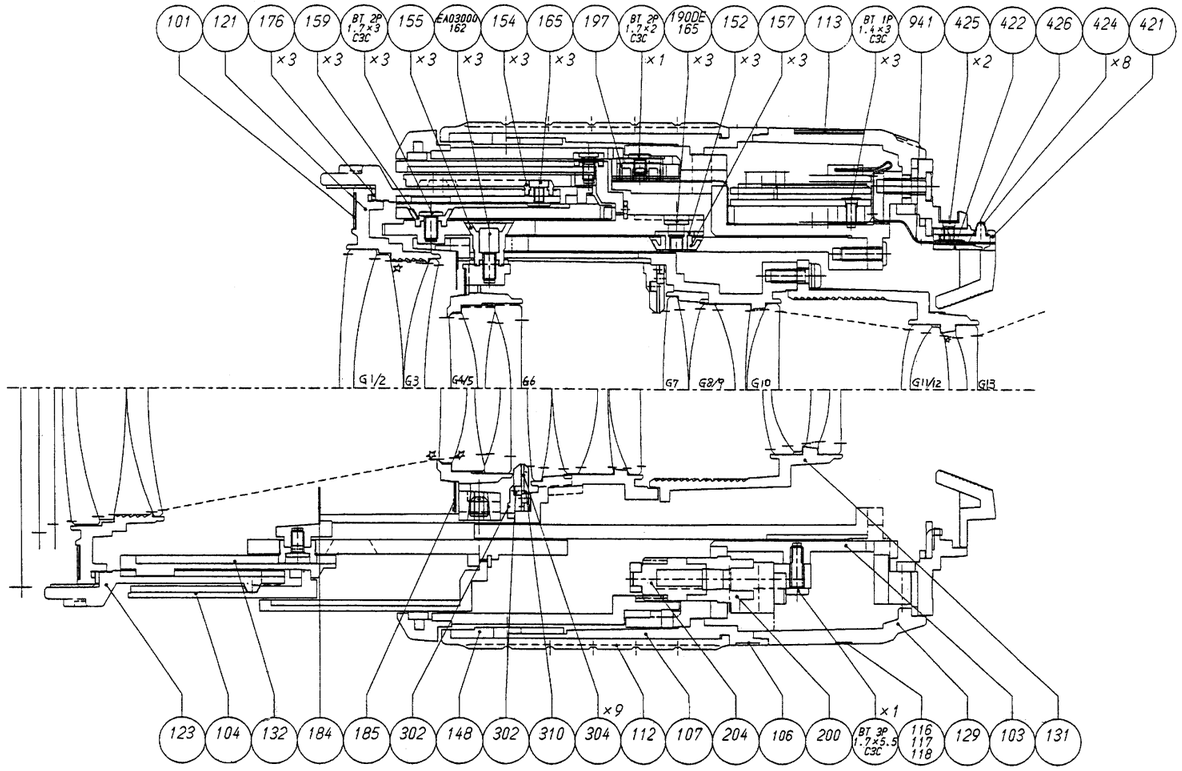


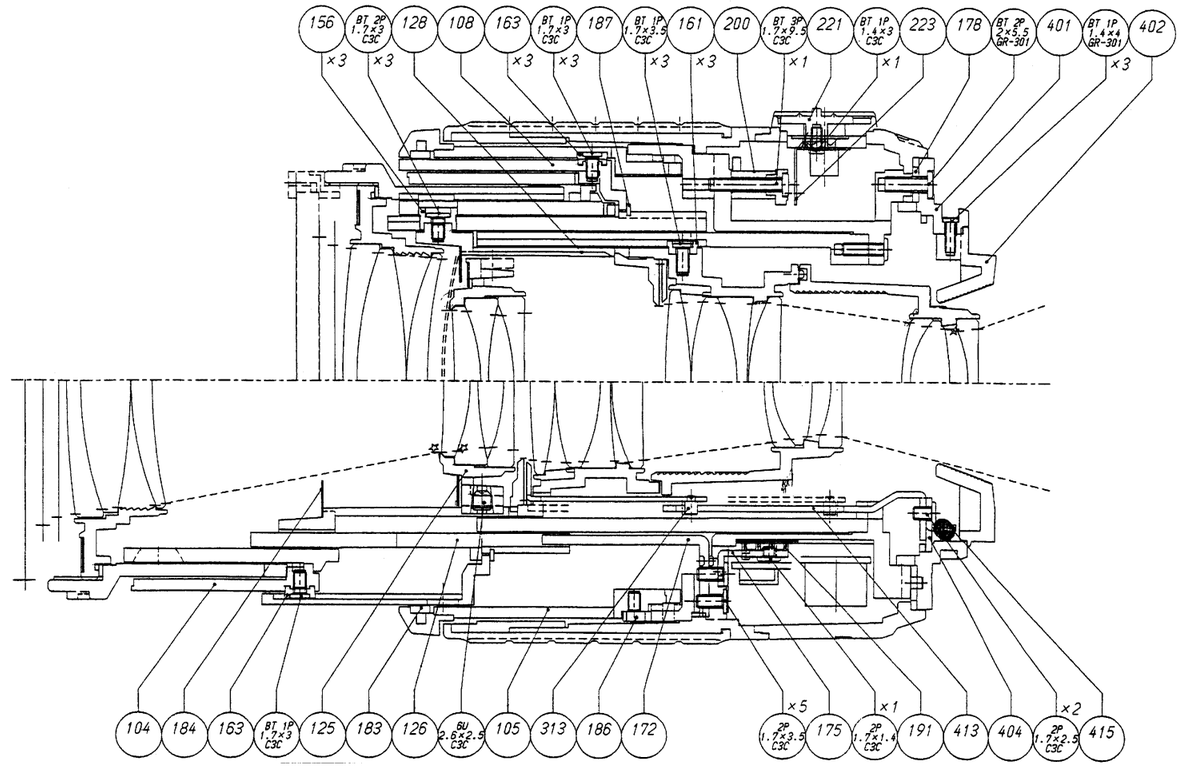
実体配線図
WIRING DIAGRAM

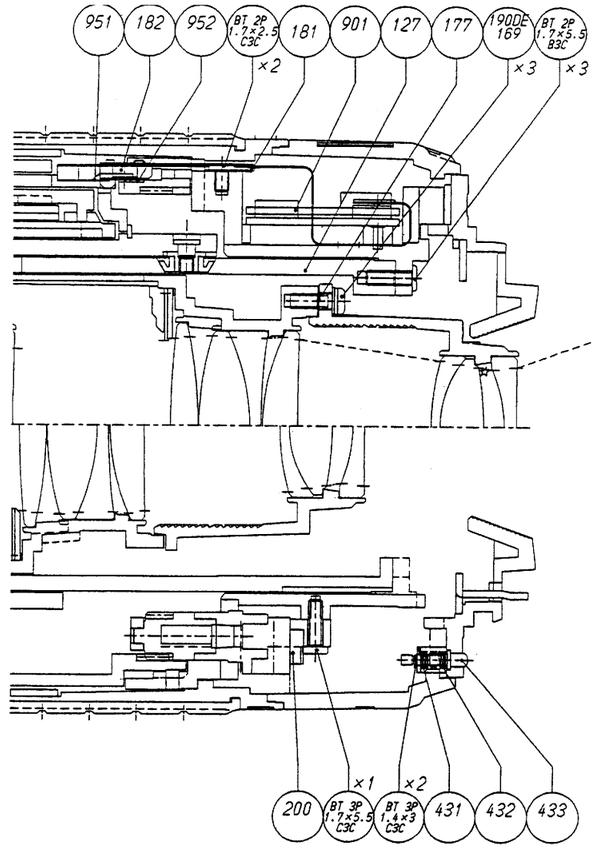
外観図 Sketch drawings

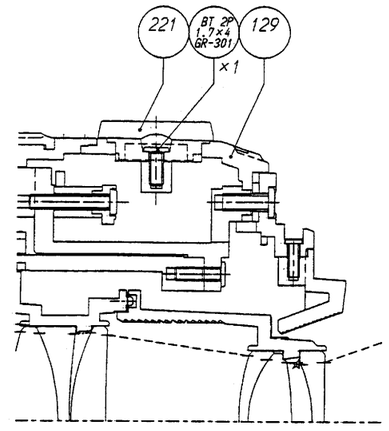


組立図 Structure of the Lens



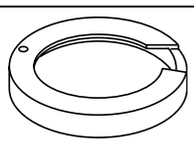
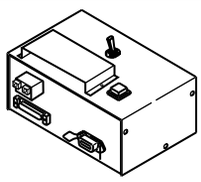
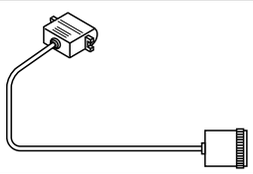
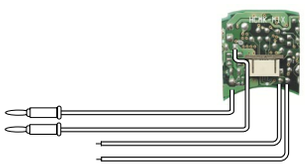




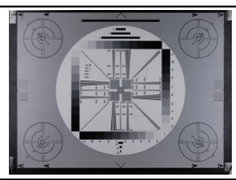
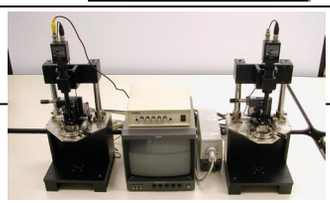


工具編 TOOLS

★：NEW TOOL

RJ 番号 RJ No.	名称 NAME OF TOOL	備考 OTHERS
J19002 	縦型焦点面検査器　ＬＴ－５００Ｓ BACK FOCUS COLLIMATER LT-500S	
J9001-5N	安定化電源５Ａ DC REGULATED POWER SUPPLY 5A	
J18028 	Ｆ用レンズ受け台 LENS ADAPTER FOR FOCUS TESTER	
★ J18386 	AF-S DX55-200 点検・調整ソフト ADJ.FD FOR AF-S DX55-200 (IBM 3.5)	
J18004-1 	Ｊ１８００４用基準ゲージ STANDARD GAUGE FOR J18004	
J15306-1 	ＡＦ－Ｉ通信ボックス AF-I LENS COMMUNICATION BOX(CE)	
J15307 	ＡＦ－Ｉ通信アダプター COMMUNICATION ADAPTER FOR AF-I	
工具設定なし RJNo.is not available 	自作工具 SELF-MADE TOOL	FOR AF-S24-85
工具設定なし RJNo.is not available 	鉛フリーはんだコテ LEAD FREE SOLDERING IRON	
J5400 	鉛フリー糸はんだ RMA02(M705) 0.5MMX500G ECO SOLDER RMA02(M705) 0.5MMX500G	
工具設定なし RJNo.is not available 	ヘクスキー（φ 1.27mm） HEX.KEY WRENCH (φ 1.27mm)	
J18379 	調芯装置用調整ソフト（ＬWM） ADJ.FD (LWM)FOR LENS ALIGNMENT	

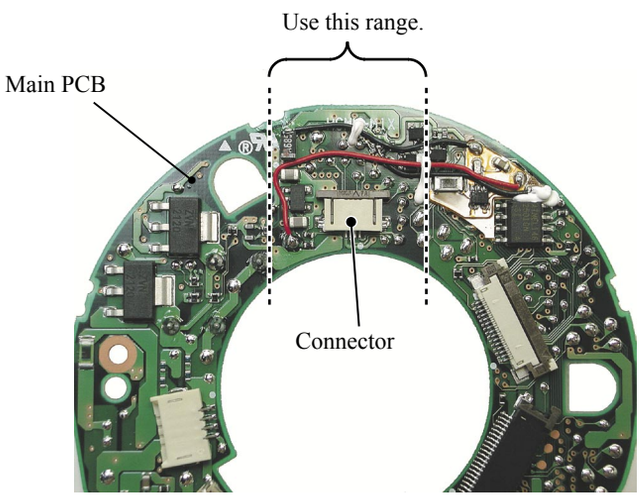
★：NEW TOOL

	RJ 番号 RJ No.	名称 NAME OF TOOL	備考 OTHERS
	J19124A 	蛍光ランプ FL15N-EDL(15W) FLUORESCENT LAMP FL15N-EDL(15W)	
	J19124 	Ｚライト Z-309 Z-LIGHT　Z-309	
	J63079 	ITE 高精細解像度チャート (4:3 反射型) ITE HIGH RESOLUTION CHART (4:3 REFLECT TYPE)	
	J19125 	周辺用調芯装置 (モニター、光源付き) LENS ALIGNMENT EGNIP FOR PERIPHERY	
	J19126	センター用調芯装置 LENS ALIGNMENT EGNIP FOR CENTER	
★	J19127 O 	55-200 用ホルダー ATTACHMENT FOR HOLDER 55-200	
	J19128 	調芯装置用チャート LENS ALIGNMENT CHART	
	J19128A 	ライトビューワー（J19128 用） LIGHT VIEWER（J19128）	
	J19129 	調芯装置用スライドレール LENZ ALIGNMENT EQUIP.SLIDE RAIL	
	工具設定なし RJNo.is not available	パーソナルコンピュータ PERSONAL COMPUTER	
	工具設定なし RJNo.is not available	オシロスコープ OSCILLOSCOP	
	OS-30MF	ドライサーフ　ＯＳ－３０ＭＦ DRY SERF OS-30MF(OIL BARRIER)	
	EDZ4113	ボンド　Ｇ 103 BONDO G103	
	EDB0011	ネジ゛ロック（赤）1401C SCREW LOCK 1401C	
★	６３０８／１０Ｋ	グリース　６３０８／１０Ｋ GREASE 6308/10K	
	C-8008B	セメダイン　（黒） CEMEDAIN 8008(BLACK)	
	G92KA	フロイル　Ｇ９２ＫＡ FLOIL G92KA	
	MZ-800S	ドライサーフ　ＭＺ－８００Ｓ DRY SURF MZ-800S	

Making of self-made tool

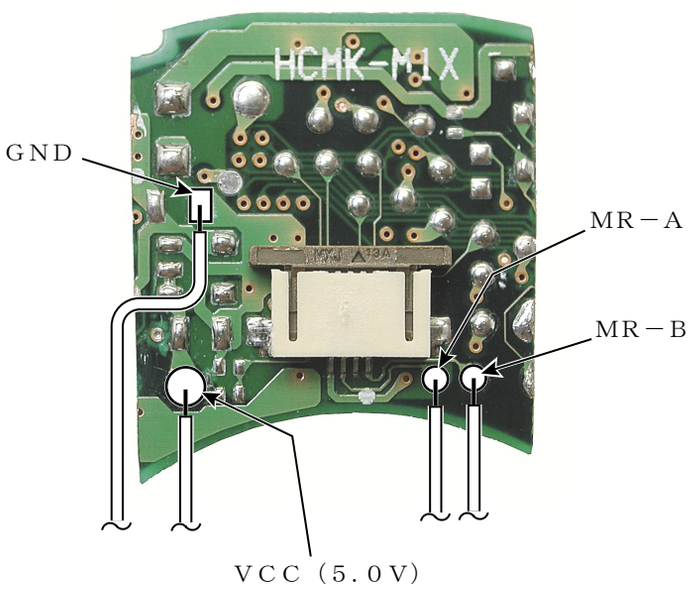
● It is necessary to make a self-made tool by using the RP main PCB of AF-S 24-85/3.5-4.5G. The self-made tool will be used for "INSPECTION AND ADJUSTMENT FOR THE WAVEFORM OUTPUT FROM MR ENCODER".

The making procedure is shown below. Make a self-made tool according to this procedure.



① Remove the elements (condenser, transistor, IC, etc.) installed within the dotted line as shown in the left from both sides of PCB. Don't remove the connector.

② Cut the PCB at the dotted line.



③ Solder the cords at 4 pattern places on the PCB as shown in the left.