INC

JAA80551-R.3757.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 Zoom-Nikkor 18-105mm f/3.5-5.6G ED VR

JAA80551

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

Printed in Japan September 2008

Before Disassembly / Reassembly / Adjustment

This lens will require optical lens alignment after assembly, in case the 5th lens-group unit is removed.
At repair service facilities, therefore, where this alignment work can not be performed, do NOT remove the 5th lens-group unit.

This lens also has the VR (vibration-reduction) unit mounted in order to correct camera shake.
To keep the accuracy of this function for stabilizing the image, in case the fixed ring unit (gyro FPC), main PCB unit, or the 3-4G lens group unit (VR unit) is replaced, be sure to make the VR adjustment by using the VR lens adjustment equipment (J15380).
At repair service facilities where the "VR lens adjustment equipment" is not prepared, do NOT disassemble nor repair the above-mentioned parts.
The VR adjustment is NOT necessary except for disassembling the above-mentioned parts.

Caution :

When disassembling/(re)assembling, be sure to use the conductive mat (J5033) and wrist strap (J5033-5) for static protection of electrical parts.

When disassembling, make sure to memorize the processing state of wires, screws to be fixed and their types, etc.

Because prototypes are used for "Disassembly", "Assembly", and "Adjustment", they may differ from the actual products in forms, etc.

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.

Plastic Mold (PM) parts

Regarding plastic mold (PM) parts of this product, there are two combinations (Pattern A and B) but note that these two are not interchangeable (so can not be mixed up).

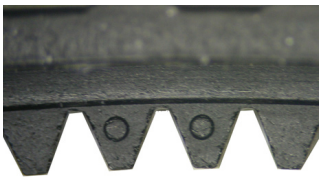
Therefore, whenever the below parts are replaced, be sure to check the IDNO (identification number) of the (old) part before replacement, and select appropriate parts with the same pattern according the chart.

< Identification No. and Interchangeability >

Description in Repair Manual	Pattern A	Pattern B
Zoom index ring	1C999-705A	1C999-705B
Fixed ring unit	1C999-706A	1C999-706B
Fixed tube unit	1C999-728A	1C999-728B
3-4 lens-group unit	1C999-707A	1C999-707B
MF ring unit	1C999-727A	1C999-727B
Zoom ring unit	1C999-730A	1C999-730B
Cover ring	1C999-731A	1C999-731B
Segment gear unit	1C999-733A	1C999-733B
Filter ring	1K631-991A	1K631-991B
Rear cover	1K631-997A	1K631-997B
Focus sliding ring	1K632-003A	1K632-003B
1st lens group unit	1B101-012A	1B101-012B
2nd lens group unit	1C999-726A	1C999-726B
5th lens group unit	1B101-015A	1B101-015B

The identification no. (IDNO) of parts is mentioned in the red circle as below.

Note: The dot and numeral are engraved in the part as follows.

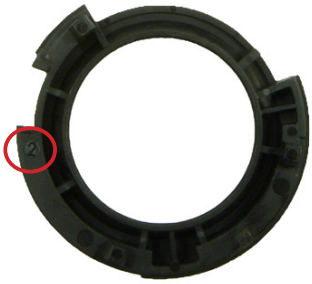


Dot

Numeral

＜ IDNO position ＞

Zoom index unit	Fixed ring unit	Fixed tube unit
1C999-705A: Numeral 1 or 2 1C999-705B: Numeral 3 or 4 	1C999-706A: Numeral 1 or 2 1C999-706B: Numeral 3 or 4 	1C999-728A:Numeral 1 or 2 1C999-728B: Numeral 3 or 4 
3-4G lens group unit	**MF ring unit**	**Zoom ring unit**
1C999-707A: Numeral 1 or 2 1C999-707B: Numeral 3 or 4 	1C999-727A: No. of dots 1 or 2 1C999-727B: No. of dosts 3 or 4 	1C999-730A: Numeral 1 or 2 1C999-730B: Numeral 3 or 4 

Cover ring	Segment gear unit	Filter ring
1C999-731A: Numeral 1 or 2 1C999-731B: Numeral 3 or 4 	1C999-733A: Numeral 1 or 2 1C999-733B: Numeral 3 or 4 	1K631-991A: No. of dots 1 or 2 1K631-991B: No. of dots 3 or 4 
Rear cover ring	**Focus sliding ring**	**1st lens group unit**
1K631-997A: Numeral 1 or 2 1K631-997B: Numeral 3 or 4 	1K632-003A: Numeral: 1 or 2 1K632-003B: Numeral 3 or 4 	1B101-012A: Numeral: 1 or 2 1B101-012B: Numeral 3 or 4 
2nd lens group unit	**5th lens group unit**	
1C999-726A: No. of dots 1 or 2 1C999-726B: No. of dots 3 or 4 	1B101-015A: Numeral 1 or 2 1B101-015B: Numeral 3 or 4 	

1. Disassembly

△ (Addition)

Disassembly of Body

VR name plate / name plate

Caution: Removing the name plate (#72) and VR name plate (#71) are NOT necessary except when the fixed tube unit (B27), name plate (#72), or VR name plate (#71) are replaced.

・Remove the name plate (#72).

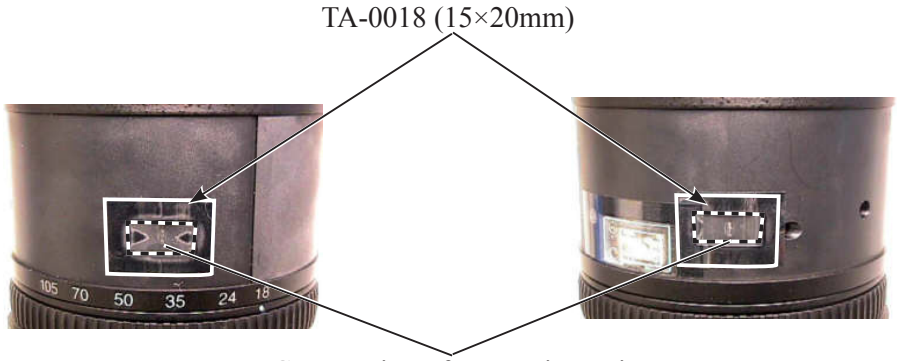
・Remove the VR name plate (#71).

サービス計画課 M

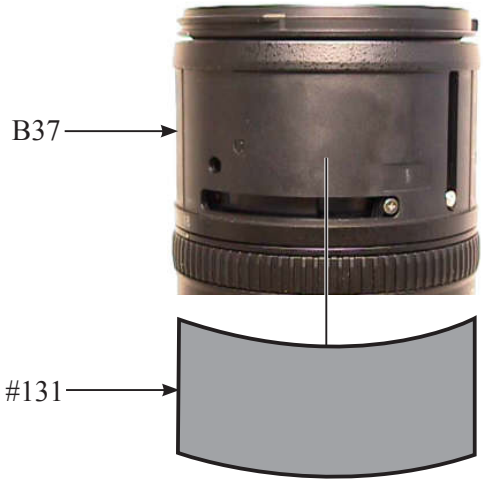
Sheet / Rubber ring

・Remove the rubber ring (#35).

・Peel off the polyester tape [TA-0018 (15×20mm)×2] from the two gate sections of the zoom ring unit, [only when replacing the zoom ring unit (B37)].

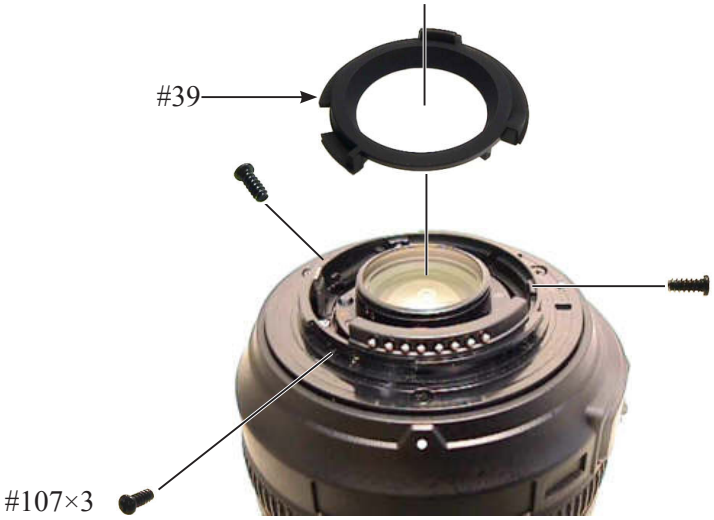


・Remove the sheet (#131) from zoom ring unit (B37).



Rear cover ring

・Take out the three screws (#107), and remove the rear cover ring (#39).



1st lens-group unit

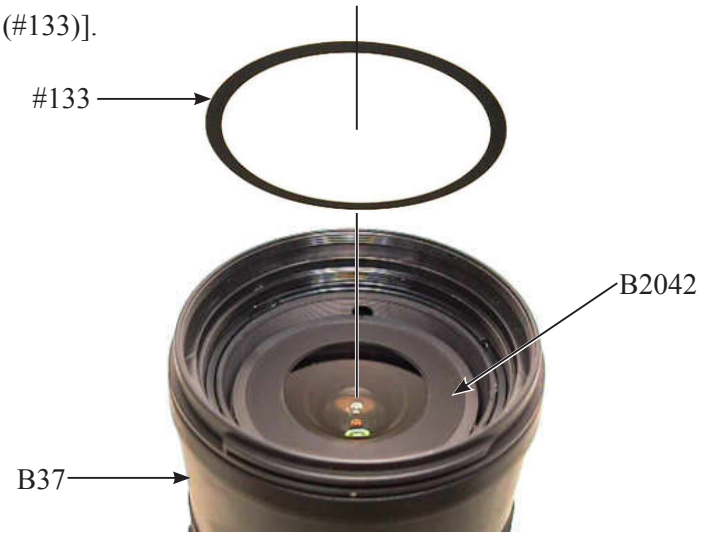
・Set the zoom ring unit (B37) to WIDE-end, and remove the sheet (#48) from 1st lens-group unit (B40).

・Set the zoom ring unit (B37) to WIDE-end. Then remove the 1st lens group unit (B40) and the washer (#80) while holding the zoom ring unit (B37) by the hand.

2nd lens group unit

Caution : "R1 surface" of the 2nd lens group unit (B2042) is aspheric lens.
Therefore, if dusts are attached to the lens surface of the 2nd lens group unit (B2042), blow them away with a blower as much as possible. If impossible, dip a wiping cloth (Savina Minimax) a little in ethanol, and wipe the surface lightly.

・Set the zoom ring unit (B37) to WIDE-end, and remove sheet (#133) from 2nd lens group unit (B2042) [Only replace sheet (#133)].



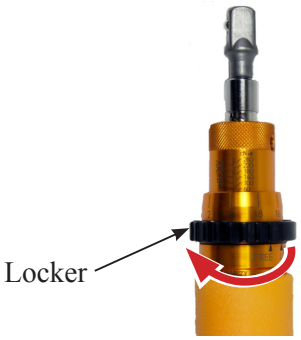
・Mount the focus sliding-frame fixed ring of the 2nd lens-G wrench (J11363). Then, turn it around until the two protrusions (of the focus sliding-frame fixed ring) are fit in the two cutouts of the focus sliding frame (#56).

Note: When the two protrusions (of the focus sliding-frame fixed ring of [J11363]) are fit in the two cutouts of the focus sliding frame (#56), rotating the lens barrel on the whole is impossible with this fixed ring being fastened.

・Based on the below, set the torque of the torque driver (J11364) to "60cN・m".

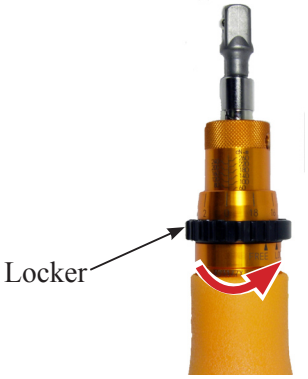
Note: Refer to the supplied operating instruction of torque driver (J11364) for how to use it.

① Turn the locker in the direction of the arrow to unlock it.

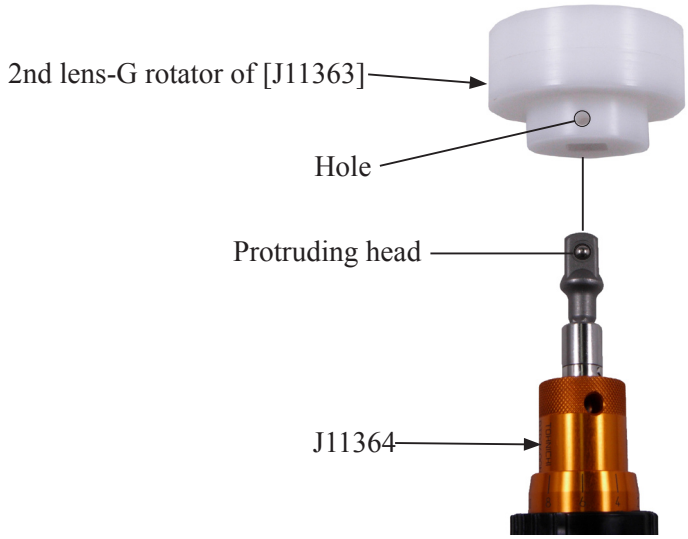


② While holding the knurled part by the right hand, turn the grip by the left hand so that the minor scale showing "0" and the major scale showing "60" can be seen.

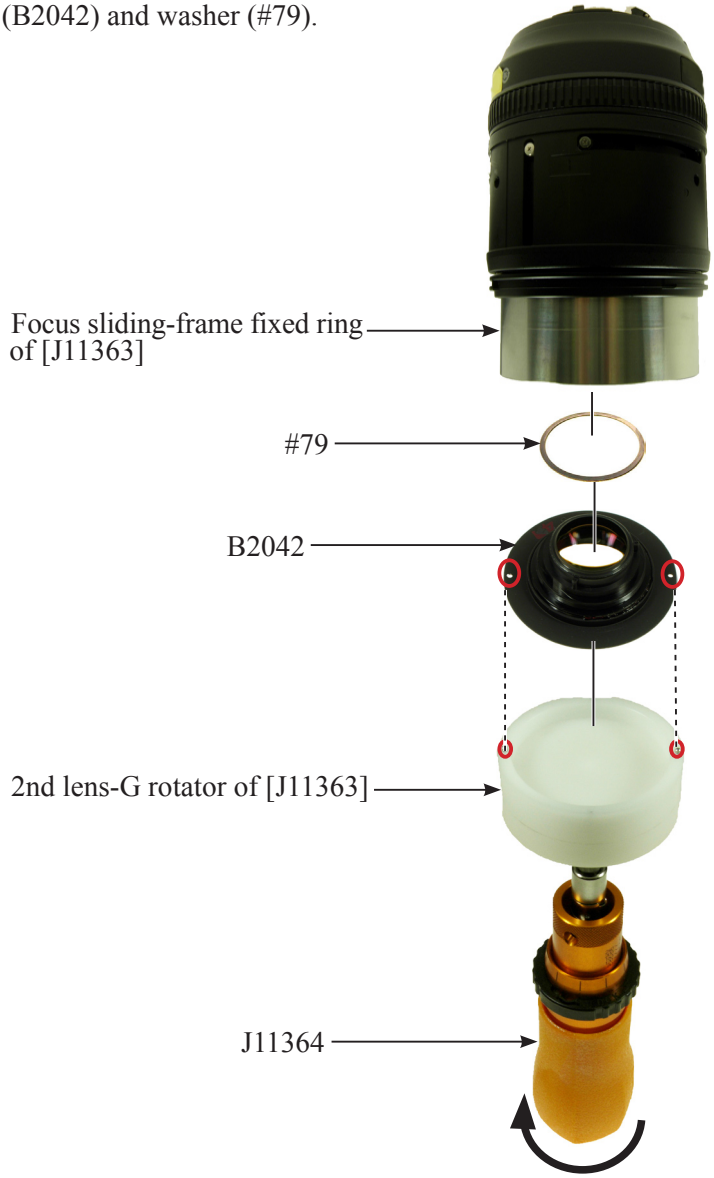
③ Turn the locker in the direction of the arrow to lock it.



・Mount the 2nd lens-G rotator of the wrench (J11363) on the torque driver (J11364) by fitting the protruding head of [J11364] in the hole of the rotator.



・Mount the 2nd-lens group unit (B2042) on the 2nd lens-G rotator of [J11363] by fitting two protrusions of the rotator in the two holes of [B2042] as below. Then, while holding the focus sliding-frame fixed ring of [J11363] and the lens barrel by one hand, turn the torque driver (J11364) and remove the 2nd lens group unit (B2042) and washer (#79).

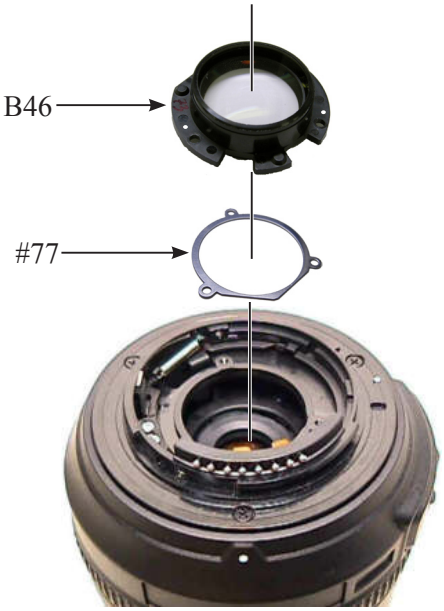


5th lens group unit

Caution : The lens alignment work will be necessary after assembly, in case the 5th lens group unit is removed.
At repair service facilities, therefore, where such alignment work can not be performed, do NOT remove the 5th lens group unit.

・Take out three screws (#98).

・Remove the 5th lens group unit (B46) and the washer (#77).



SW block unit

・Take out the screw (#115) from SW block unit (B111).

・Remove the SW block unit (B111) from the connector.

Bayonet mount unit

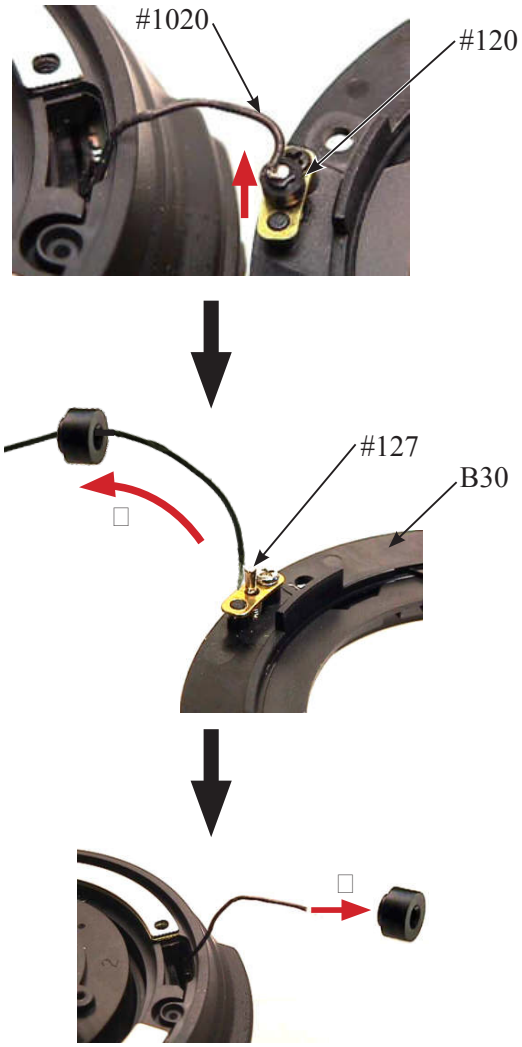
・Take out the two screws (#105).

・Take out the three screws (#99).

・Lift the bayonet mount unit (B30), and remove the lever of the bayonet mount unit (B30) from the groove.

Caution:Do not cut GND lead wire (#1020).

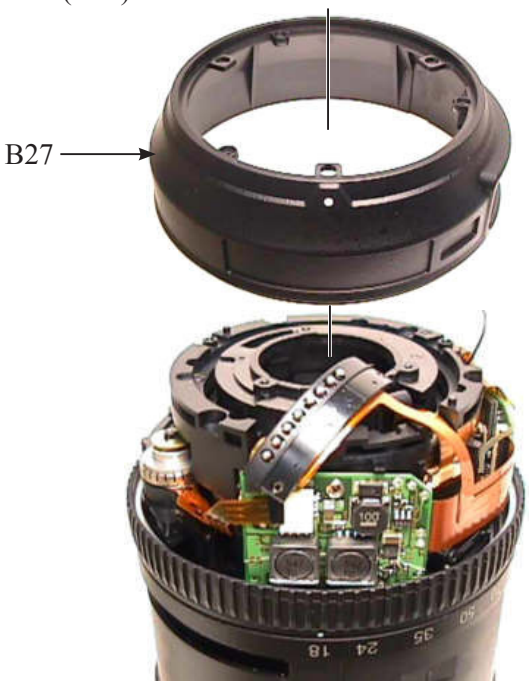
・Lift and remove the roller (#120) (as in ①), then remove the GND lead wire (#1020) from the bayonet mount unit (B30) (as in ②).



・Remove the washer (#78).

Fixed tube unit

・Remove the fixed tube unit (B27).

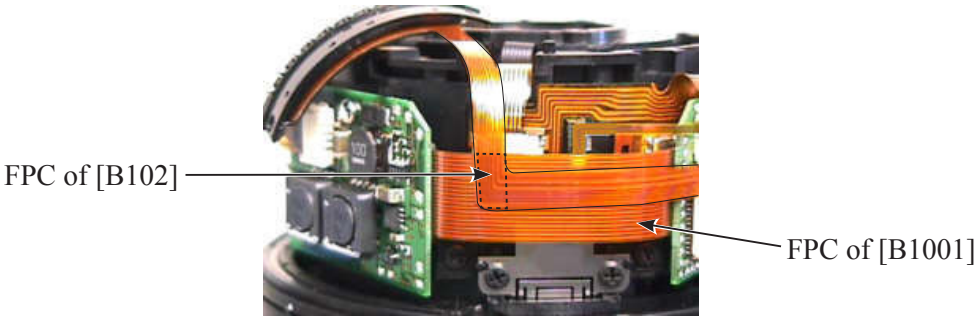


MF ring unit

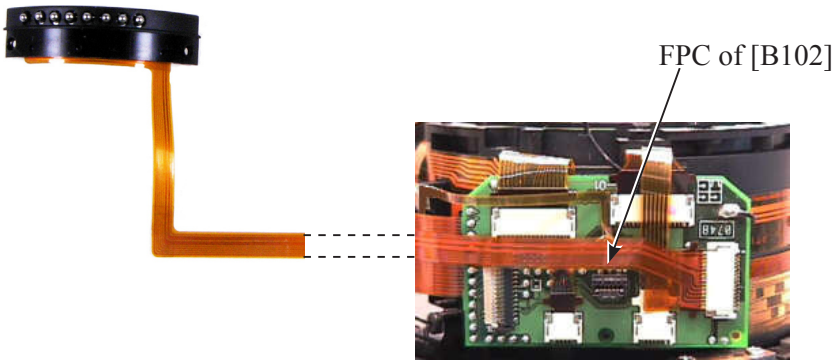
・Remove the washer (#140) and the MF ring unit (B26).

Main PCB unit

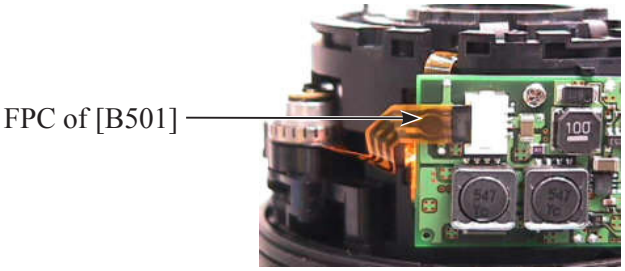
・Peel off the FPC of the contact unit (B102) from the FPC of main PCB unit (B1001).



・Remove the FPC of contact unit (B102) from the connector.

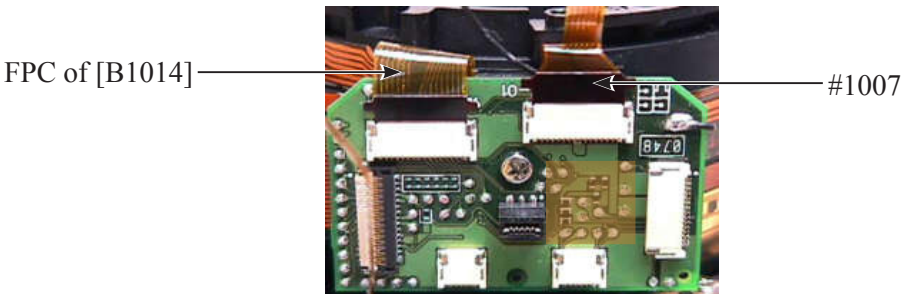


・Remove the FPC of SWM unit (B501) from the connector.

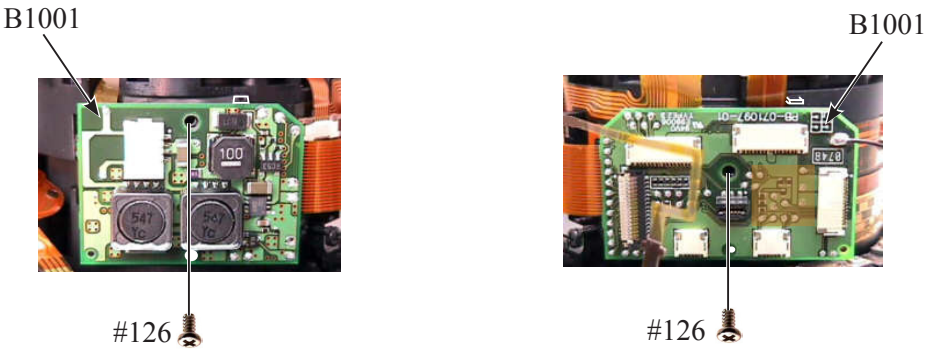


・Remove the FPC of GMR unit (B68) and gyro PCB unit from each connector.

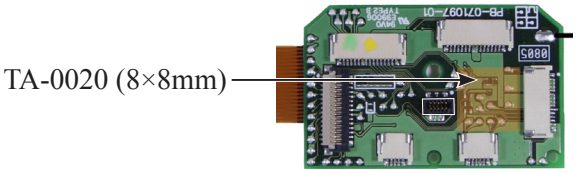
・Remove the FPC of relay-FPC unit (B1014) and zoom encoder FPC (#1007) from each connectors.



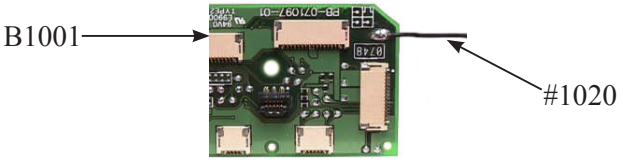
・Take out the two screws, and remove the main PCB unit (B1001).



・Peel off the polyester tape [TA-0020（8×8mm)] **from main PCB unit (B1001) [Only when replacing the main PCB unit (B1001)]**.

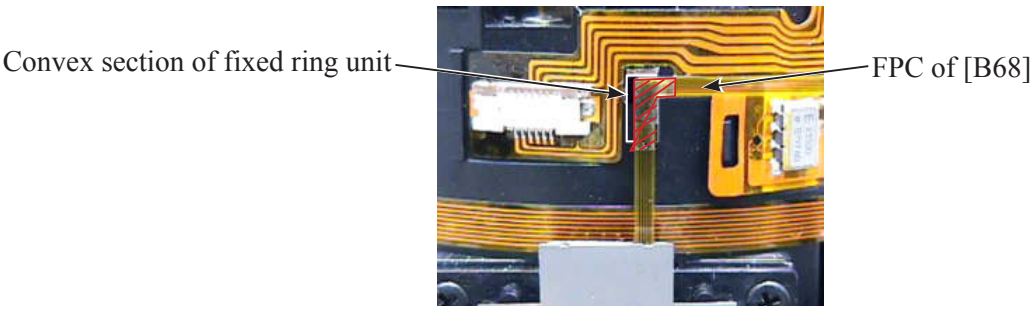


・Remove the GND lead wire (#1020) from the main PCB unit (B1001) [Only when replacing the main PCB unit (B1001) or GND lead wire (#1020)] .

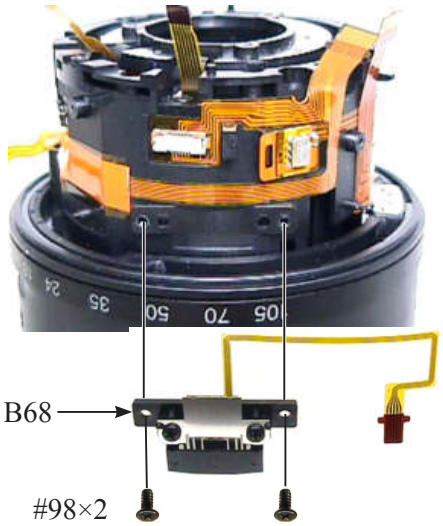


GMR unit

・Detach the FPC of GMR unit (B68) from the convex section of fixed ring unit.

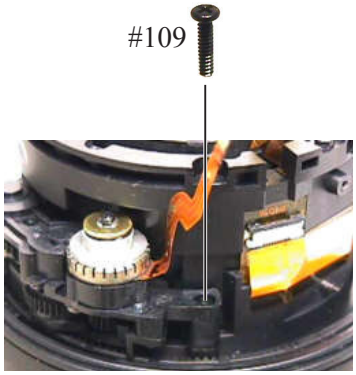


・Take out the two screws (#98), and remove the GMR unit (B68).



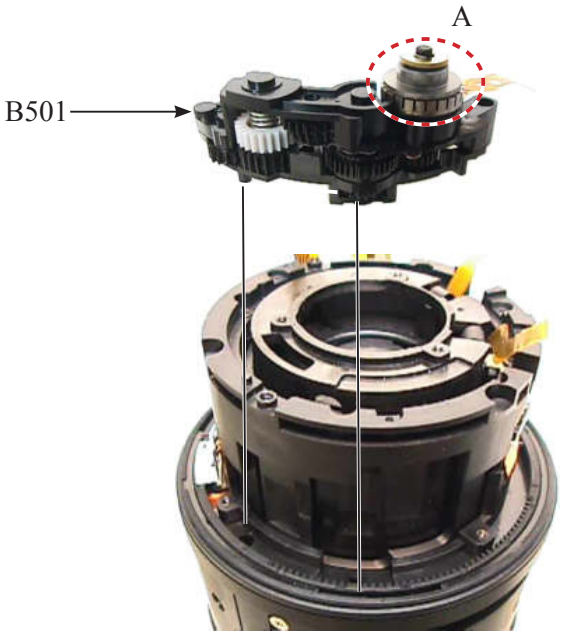
SWM unit

・Take out the two screws (#109).



・Remove the SWM unit (B501).

Caution: Do NOT touch the below "A" area, because attaching sweat or oil of hand to this area will cause abnormal noise of the motor or malfunction.



Brush unit

・Take out the screw (#116), and remove the brush unit (B117).

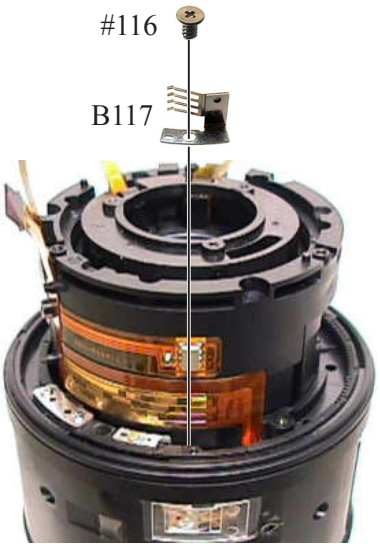
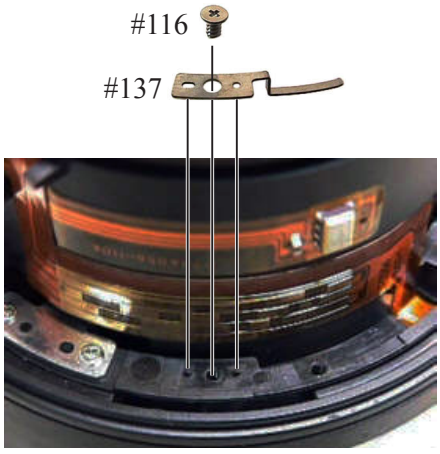


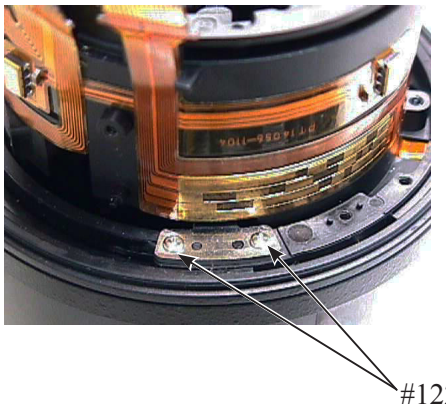
Plate spring

・Take out the screw (#116). Then remove the plate spring (#137).

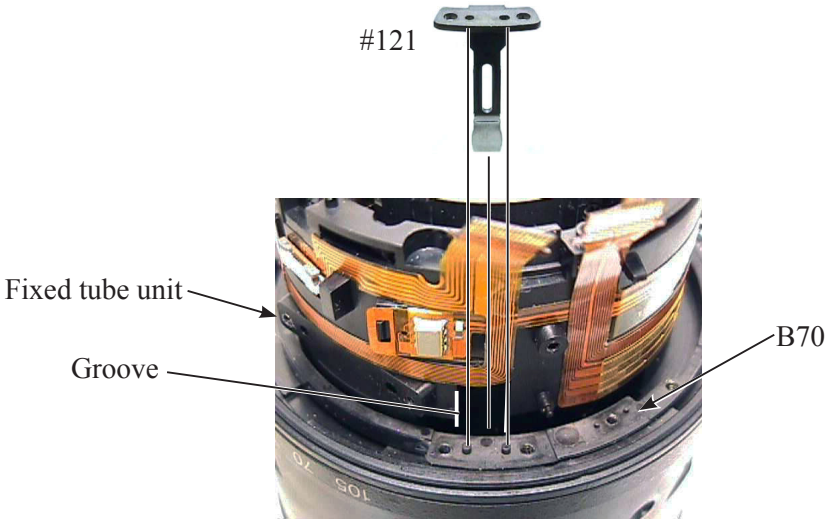


Focus sliding ring / Focus key

・Take out the two screws (#122).



・Turn the segment gear unit (B70), and place the position of focus key (#121) by fitting in the groove of the fixed tube unit. Then remove the focus key (#121).



・Remove the focus sliding ring (#56).

3-4G lens group unit 2 / Fixed ring unit 2

・Remove the VCM-FPC (#1003) and the hall element PCB unit from each connector.

・Take out the screw (#61).

・Take out the four screws (#98), and remove the fixed ring unit 2 from the 3-4G lens group unit 2.

Disassembly of the Fixed ring unit 2

Segment gear unit

・Remove the segment gear unit (B70).

Zoom brush unit

・Peel off the polyester tape [TA-0008 (15×30mm)], and remove the zoom brush unit (B73).

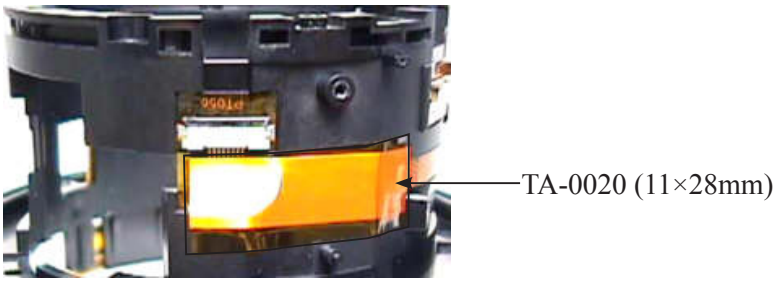
Zoom ring unit

・Take out the screw (#124).

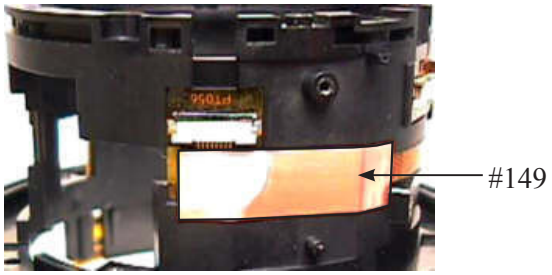
・Turn and remove the zoom ring unit (B37).

Relay-FPC unit

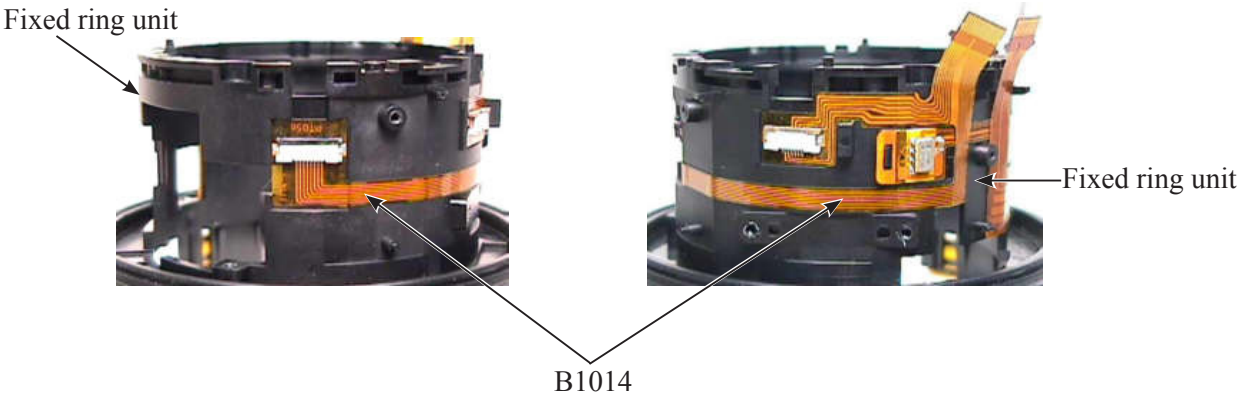
・Peel off the polyester [TA-0020 (11×28mm)].



・Remove the tape (#149).



・Peel off the relay-FPC unit (B1014) from the fixed ring unit.



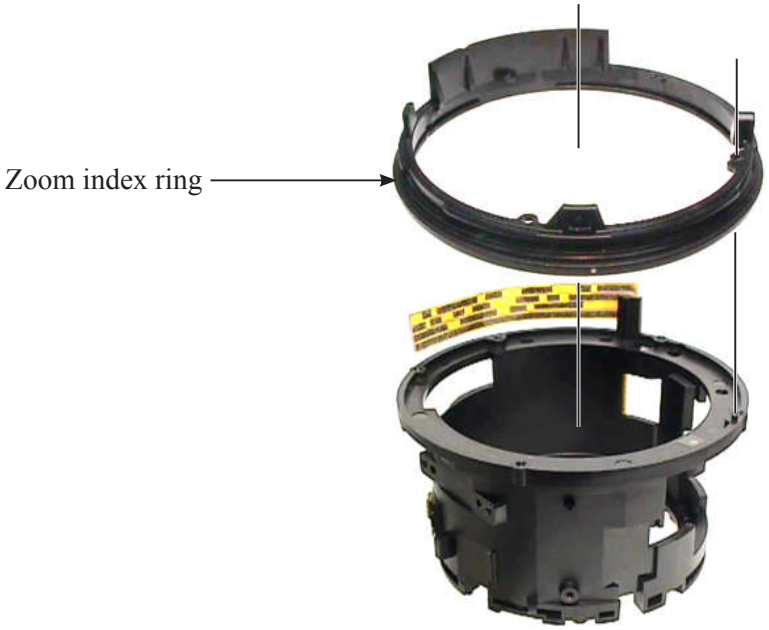
Zoom index ring

・Remove the two silicone rubbers (#92) [Only when replacing the silicone rubber (#92)].

・Peel off the zoom encoder FPC (#1007) from the zoom index ring.

・Take out the five screws (#98).

・Remove the zoom index ring.



・Peel off the zoom encoder FPC (#1007) from the fixed ring unit.

Disassembly of the 3-4G lens group unit 2

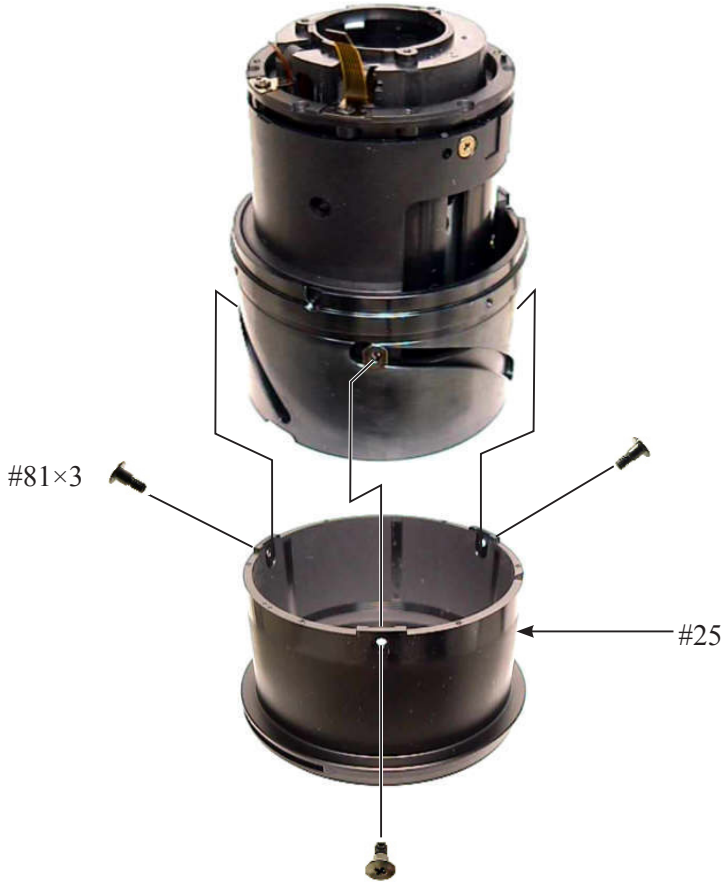
Cover ring unit

・Take out the three screws (#123).

・Remove the cover ring unit (B38).

Filter ring

・Take out the three screws (#81), and remove the filter ring (#25).



・Take out the roller unit (B83).

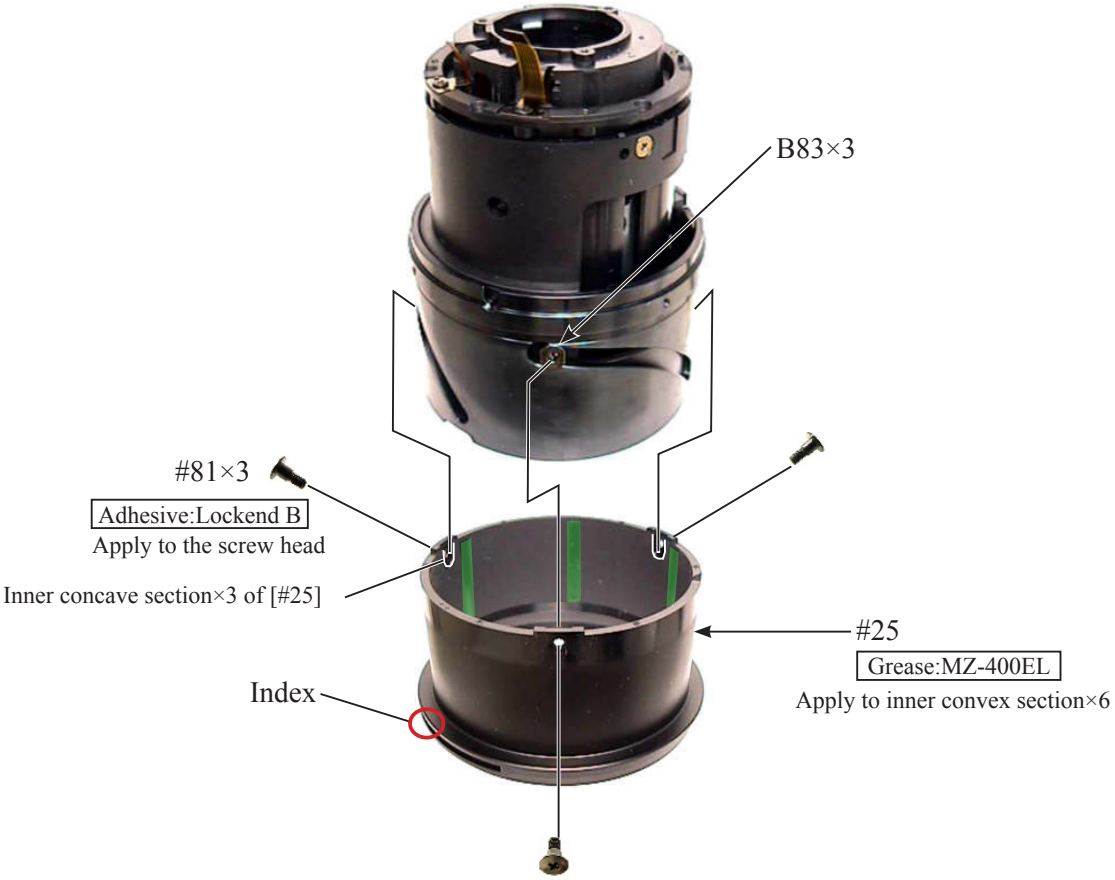
2. Assembly

Assembly of 3-4G lens group unit 2

Filter ring

・Put the roller unit (B83) into each groove at three places of the 1st lens-G sliding tube (#51) and of the outside cam tube (#53).

・Assemble the filter ring (#25) by fitting the three roller units (B83) with the inner concave sections of the filter ring (#25), and tighten three screws (#81).



Cover ring

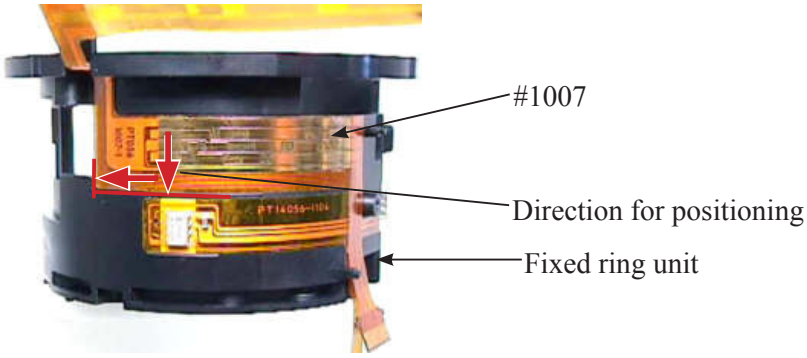
・Mount the cover ring (B38).

・ Rotate the cover ring (B38), and align the three screw holes. Tighten the three screws (#123).

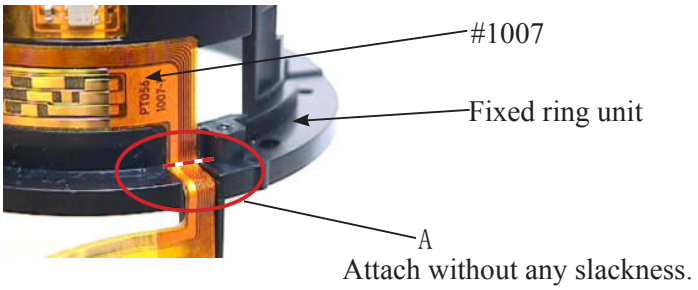
Assembly of Fixed ring unit 2

Zoom index ring

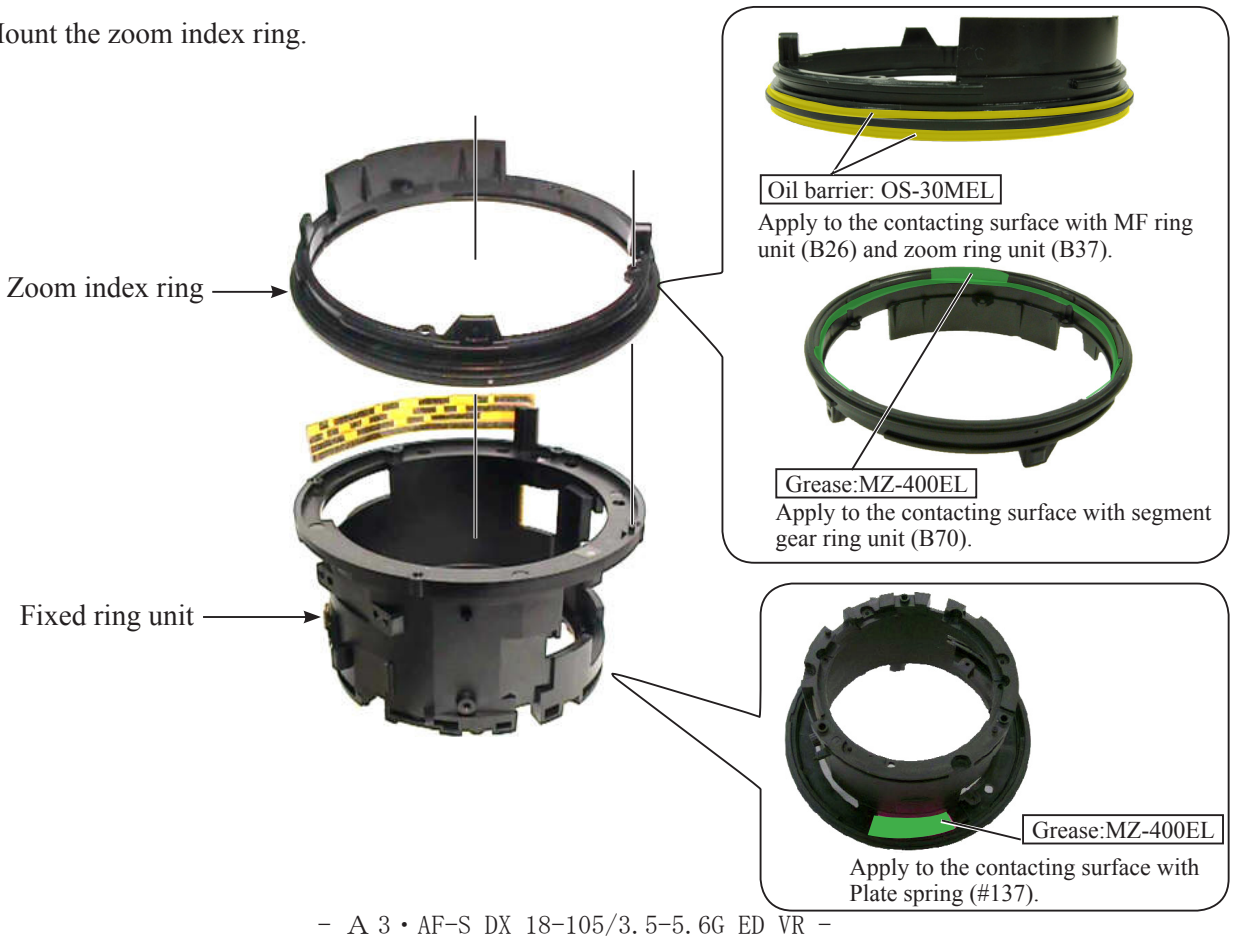
・Peel off the backing paper of the zoom encoder FPC (#1007), and adhere it to the fixed ring unit.



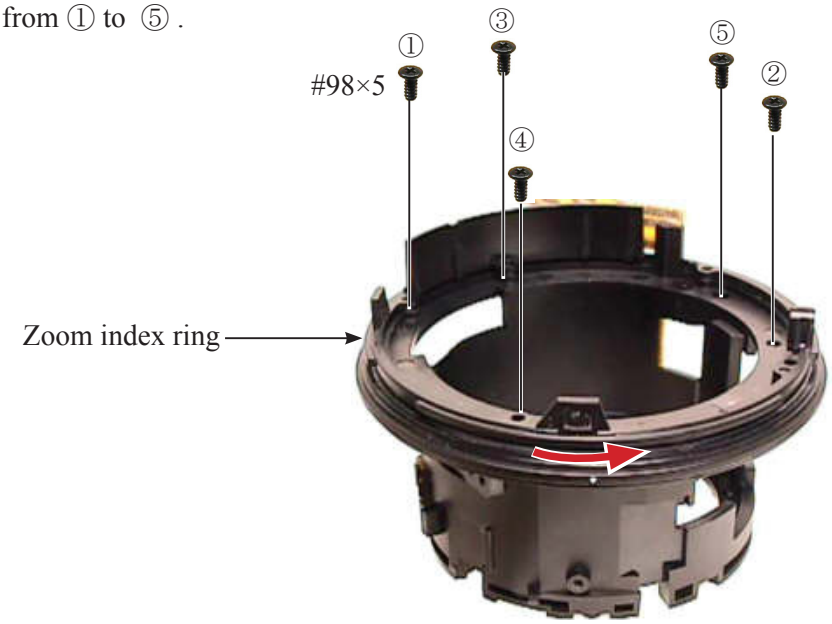
・Attach "A" area of the zoom focus encoder FPC (#1007) to the fixed ring unit by pressing with a stick, etc.



・Mount the zoom index ring.



・Position the zoom index ring in the direction of the arrow, and tighten the five screws (#98) in numeric order from ① to ⑤ .



・Peel off the backing paper of the zoom encoder FPC (#1007), and attach the FPC by positioning in the direction of the arrow.

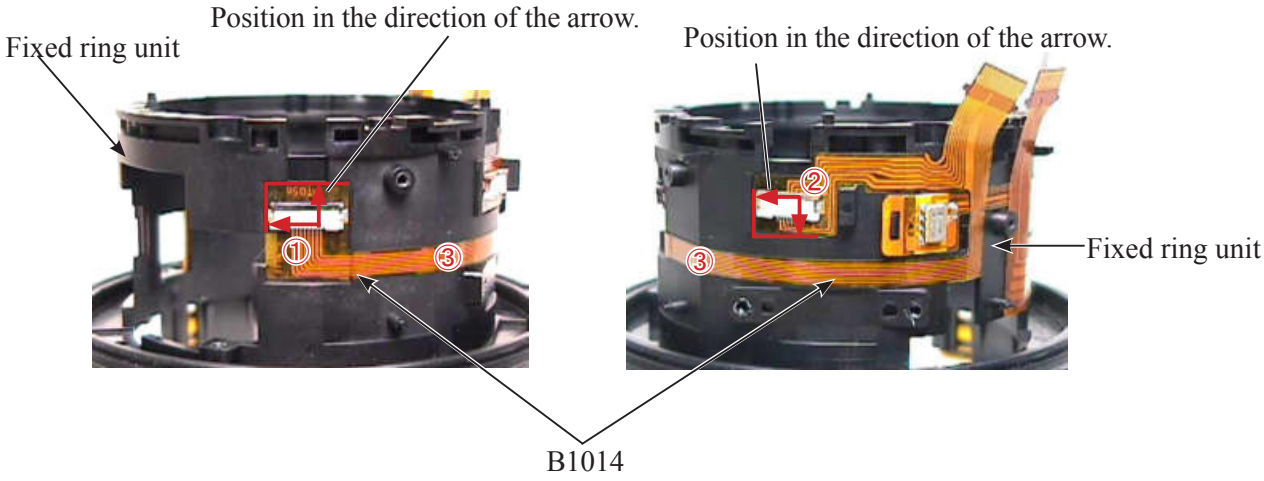
Caution: Do NOT touch the sticky area of the zoom encoder FPC (#1007) with fingers.

・Mount the two silicone rubbers (#92), [only when replacing the silicone rubber (#92)].

Relay-FPC unit

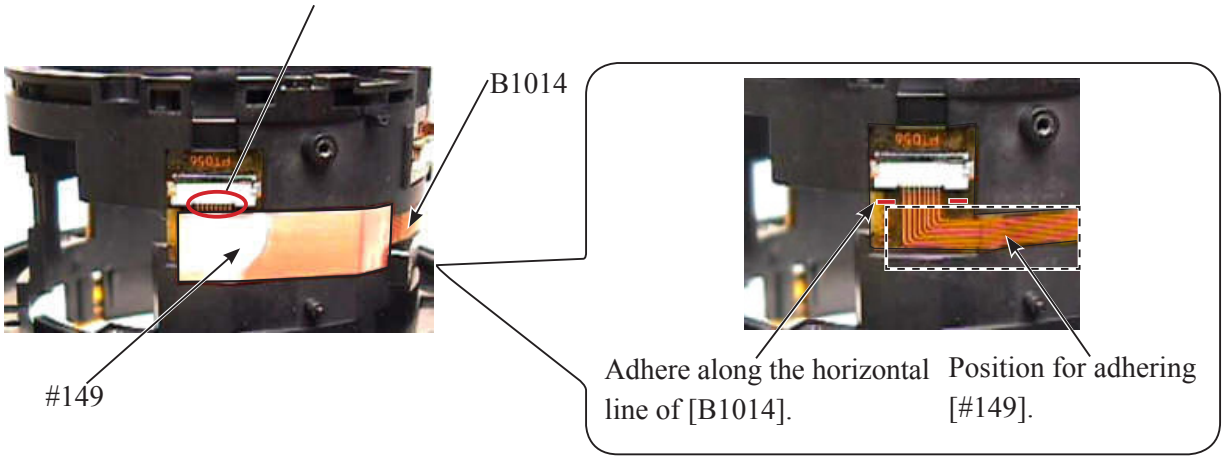
・Peel off the backing paper of the relay-FPC unit (B1014), and adhere the FPC to the fixed ring unit in numeric order from ① to ③ .

Caution: Do NOT touch the sticky area of the relay-FPC unit (B1004) with fingers.

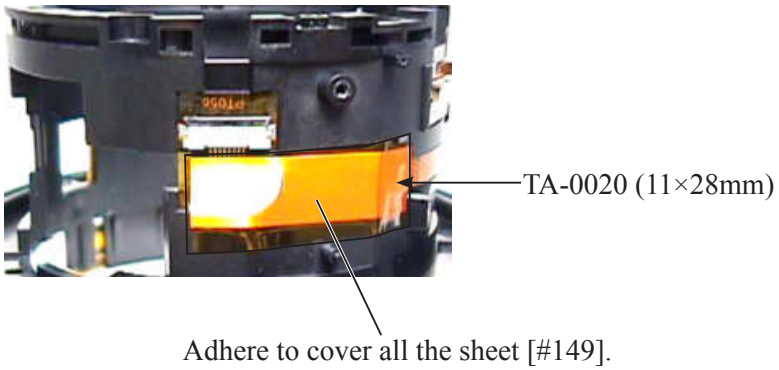


・Adhere the tape (#149) on the relay-FPC unit (B1014).

Adhere the tape (#149) so that it does not touch the connector's soldered area of [B1014].



・Adhere the tape [TA-0020 (11×28mm)] on the sheet (#149).



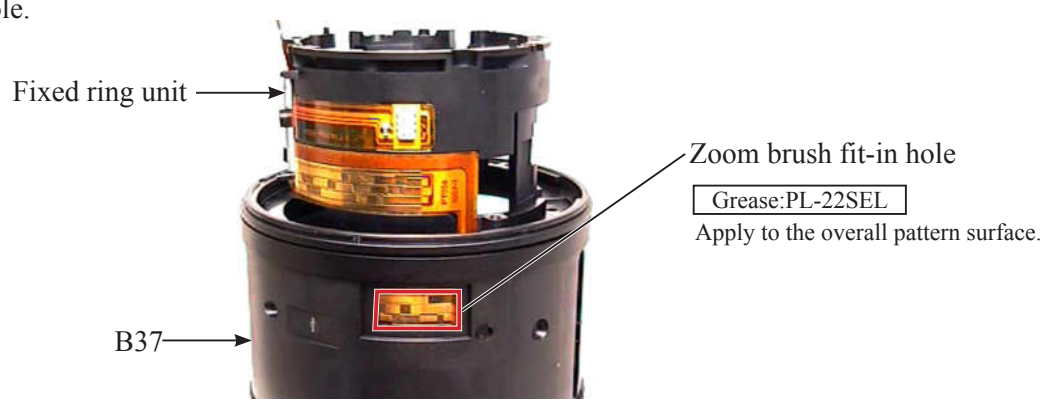
Zoom ring unit

・Mount the zoom ring unit (B37).

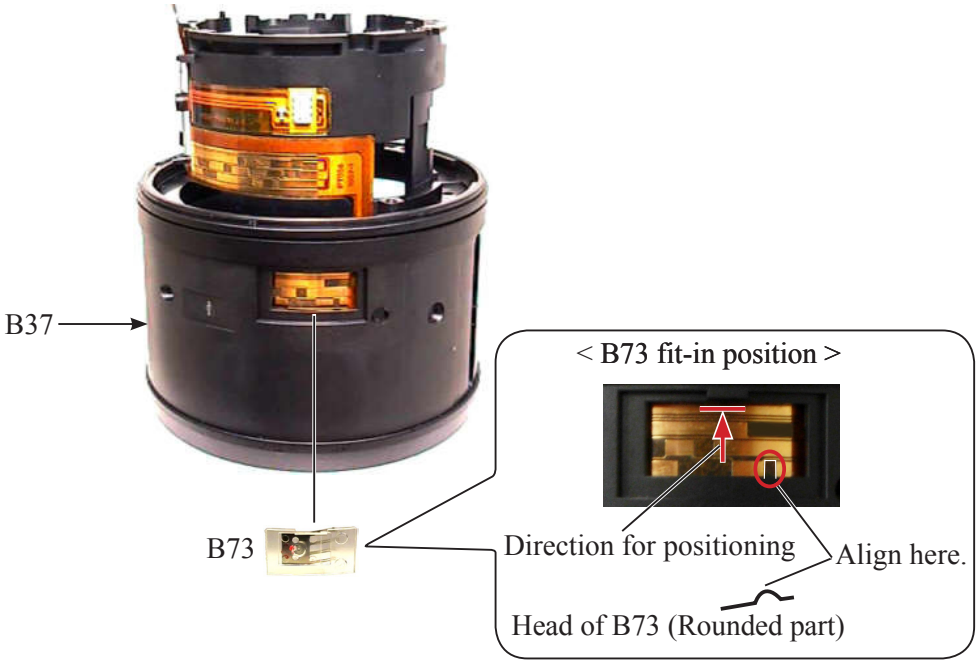
・Tighten the screw (#124).

Zoom brush unit

・While turning the fixed ring unit, apply the grease (PL-22SEL) to the zoom pattern surface through the zoom brush fit-in hole.



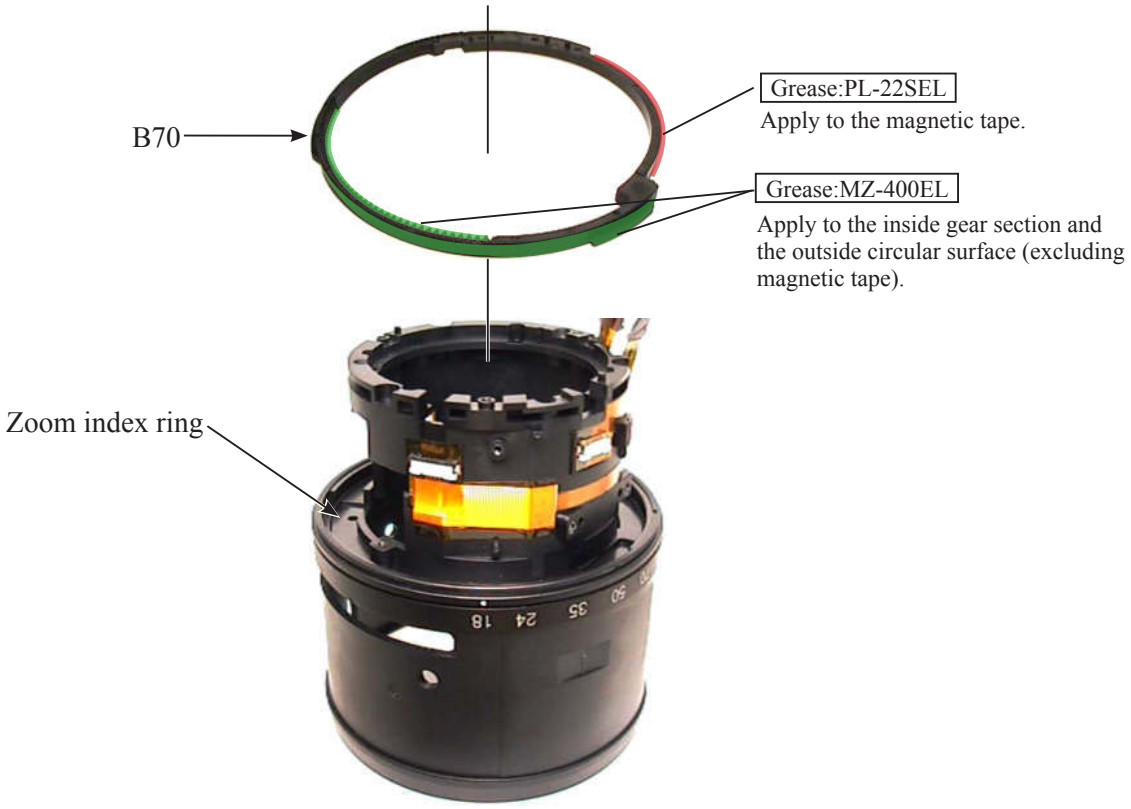
・Set the zoom ring unit (B37) to the WIDE-end, and mount the zoom brush unit (B73).



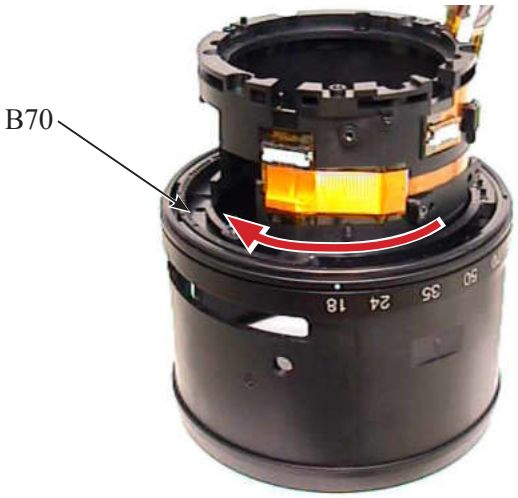
・Adhere the tape [TA-0008 (15×30mm)].

Segment gear ring unit

・Mount the segment gear ring unit (B70) by fitting its shape with the zoom index ring.



・Turn the assembled segment gear ring unit (B70) in the direction of the arrow all the way.



Assembly of Body

3-4 lens group unit 2 / Fixed ring unit 2

・Set the 3-4 lens-G unit 2 and fixed ring unit 2 to WIDE-end.

・Mount the fixed ring unit 2 on the 3-4 lens-G unit 2, and tighten the four screws (#98) in numeric order from ① to ④ .

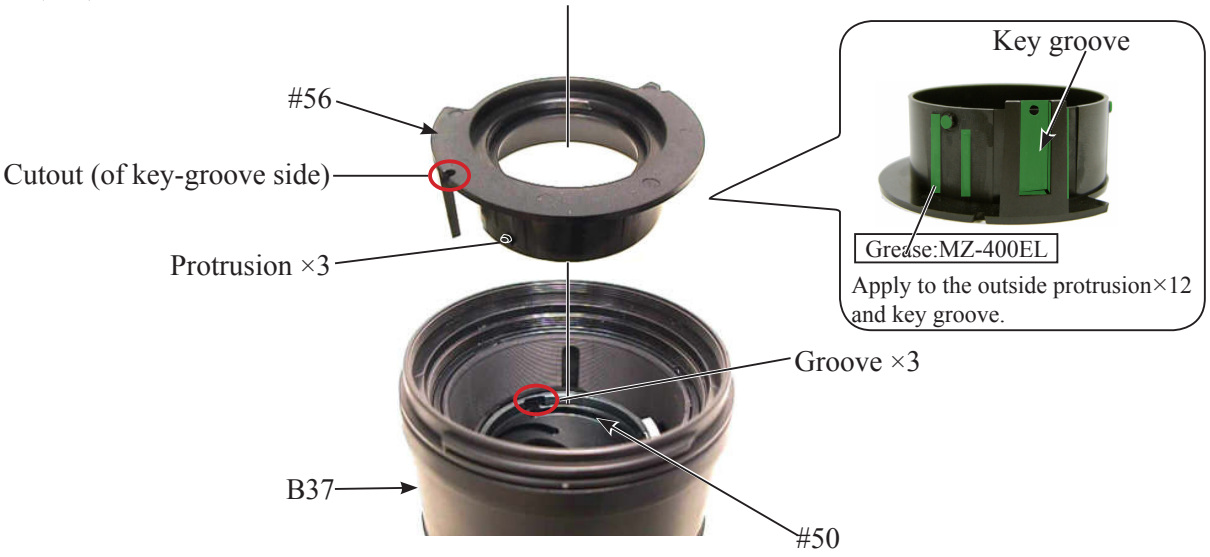
・Align the screw hole with the vertical groove, and tighten the screw (#61).

・Connect the VCM-FPC (#1003) and hall-element PCB unit (B1005) to each connectors.

Focus sliding frame / Focus key

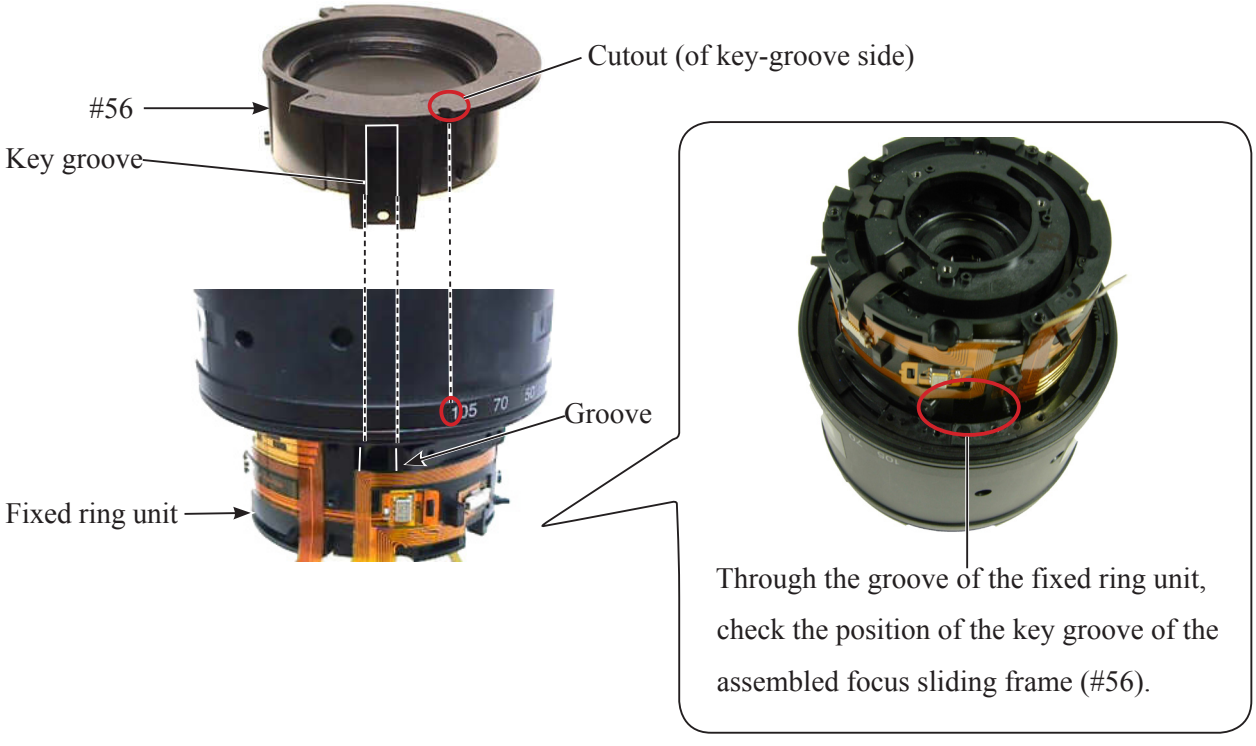
・Set the zoom ring unit (B37) to WIDE-end.

・Align the cutout (of key-groove side) of the focus sliding frame (#56) with the letters "70" of the zoom ring unit (B37). Then, fit the three protrusions of the focus sliding frame (#56) in the three grooves of the cam tube (#50).

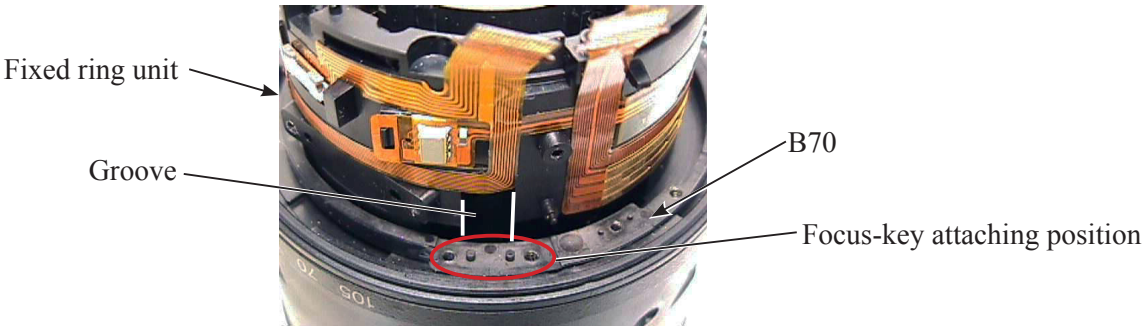


・Turn the focus sliding frame (#56), and align the key groove of [#56] with the groove of the fixed ring unit.

Note: To make the above alignment easier, align the cutout (of key-groove side) of [#56] with the letter "1" (of "105") of the zoom ring unit (B37).

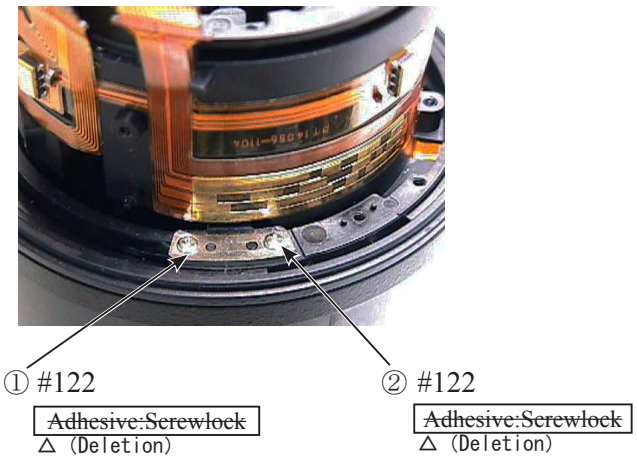


・Align the focus-key attaching position of the segment gear ring unit (B70) with the groove of the fixed ring unit as below.



・Place the focus key (#121) from the groove of the fixed ring unit, and put down so that the head of the focus key (#121) reaches the key groove of the focus sliding frame (#56).

・Tighten the two screws (#122) in numeric order from ① to ② .



・Turn the segment gear ring unit (B70) and confirm that the focus sliding frame (#56) moves sequentially.

サービス計画課 M

Plate spring

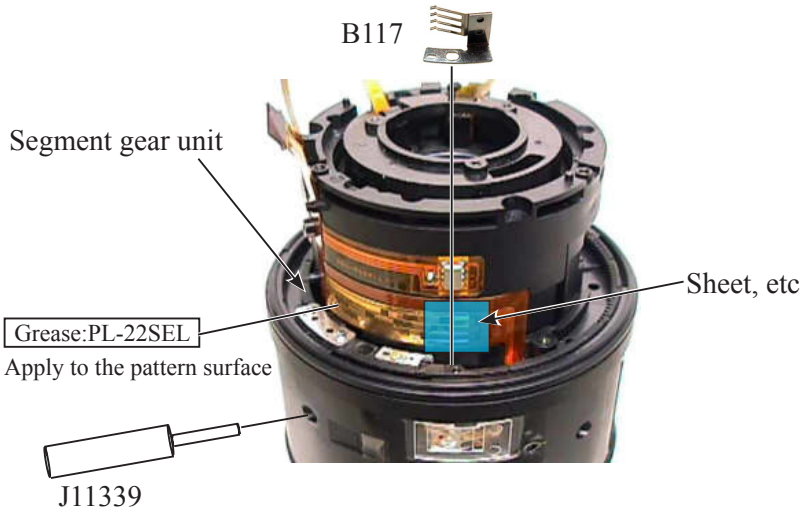
・Mount the plate spring (#137), tighten the screw (#116).

Brush unit

・Insert the infinity pin (J11339), and mount the brush unit (B117).

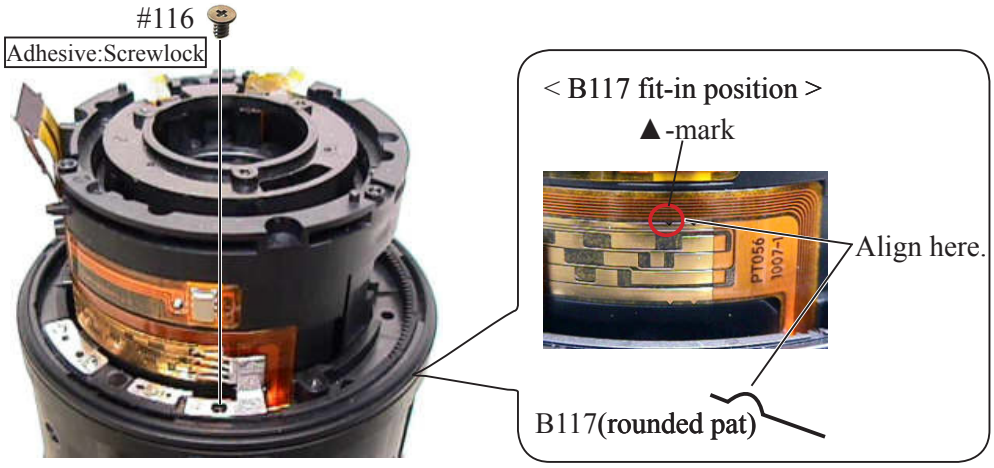
・When mounting [B117], cover the upper area of the pattern with a sheet, etc, (approx. 20×20mm), in order to prevent bending of brush.

Note: When inserting [J11339], set the segment gear ring unit to infinity-end, then insert [J11339] by pushing in it while turning the segment gear ring unit toward CLOSE.



サービス計画課 M

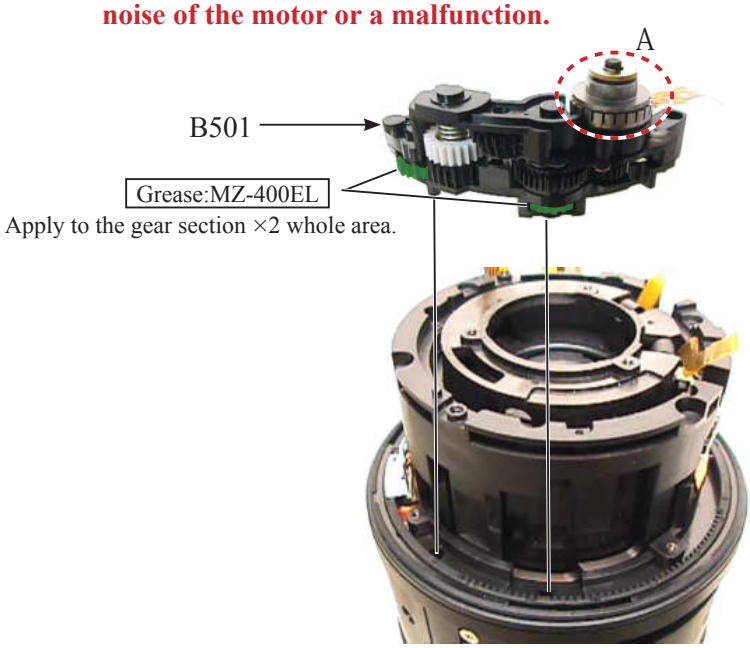
・Align the head (rounded part) of the brush unit (B117) with "▲-mark" of the upper part of the encoder pattern, then tighten the screw (#116).



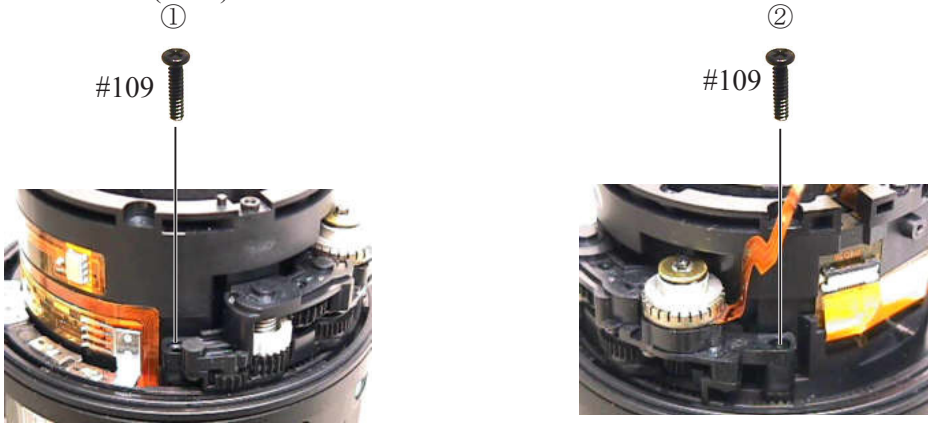
SWM unit

・Mount the SWM unit (B501).

Caution: Do NOT touch "A" area by hand, because attaching sweat or oil will cause an abnormal noise of the motor or a malfunction.

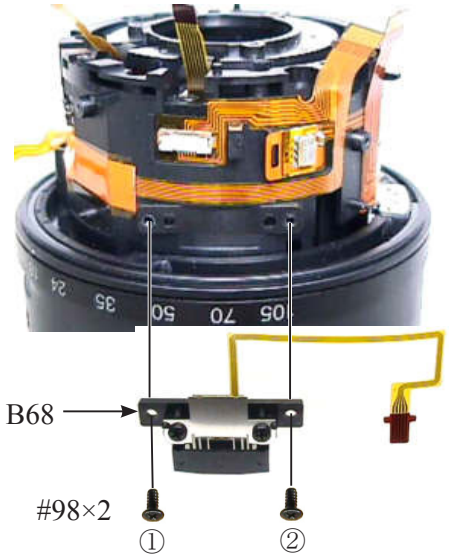


・Tighten the two screws (#109) in numeric order from ① to ② .

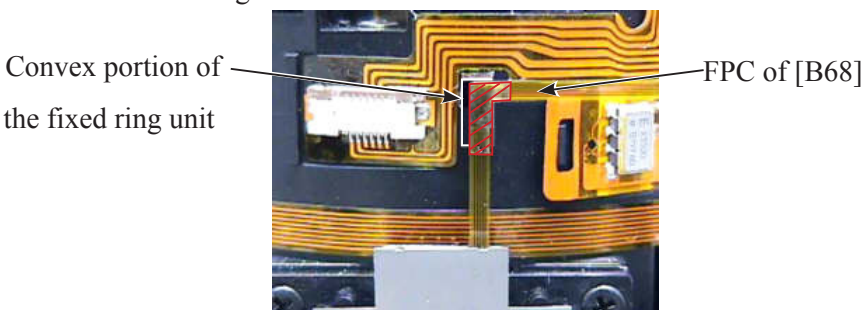


GMR unit

・Mount the GMR unit (B68), and tighten the two screws in numeric order from ① to ② .



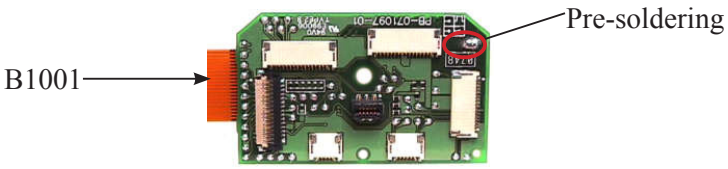
・Peel off the FPC's backing paper of the GMR unit (B68). Then attach the FPC of the GMR unit (B68) to the convex portion of the fixed ring unit.



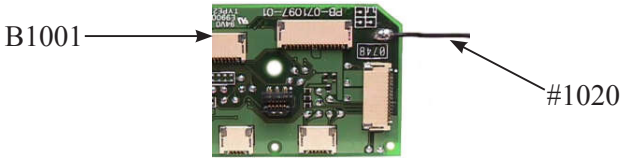
・**When the GMR unit (B68) is disassmelbed or replaced, inspect and adjust the GMR output waveform by referring to "Inspection and Adjustment of GMR output waveform" of "Adjustment" on Page A33.**

Main PCB unit

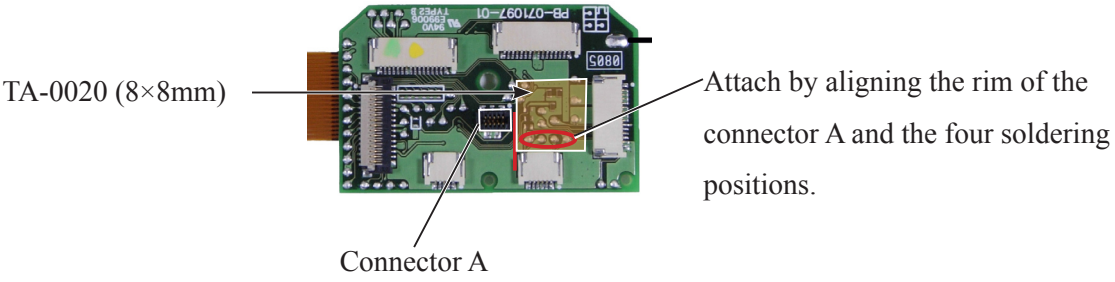
・Make a preliminary soldering on the main PCB unit (B1001), [only when the GND lead wire (#1020) is replaced.)



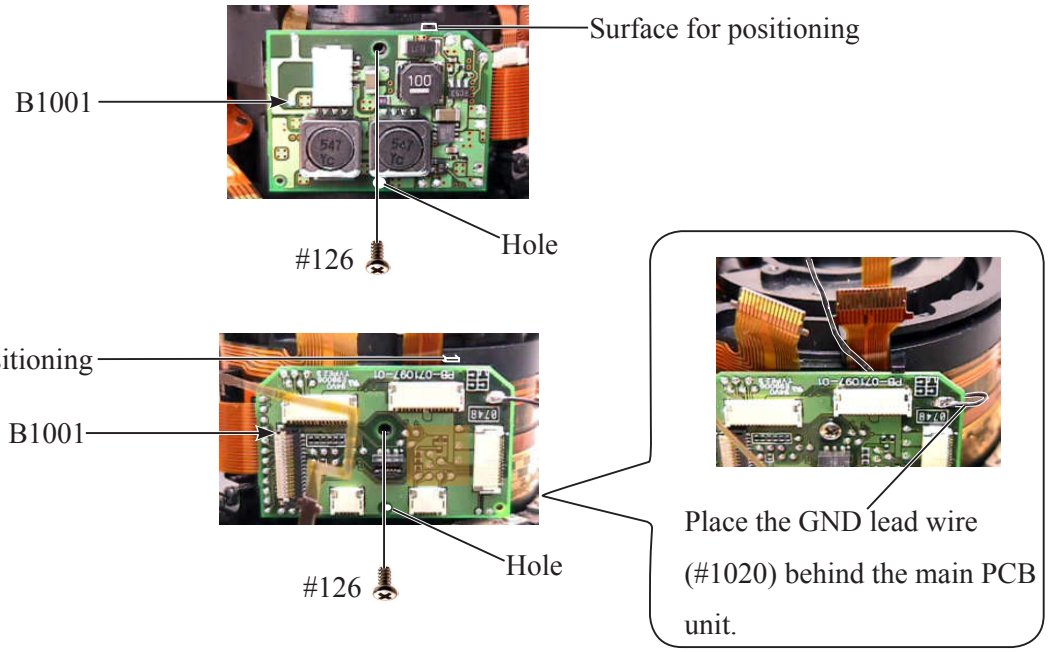
・Solder the GND lead wire (#1020) on the main PCB unit (B1001), [only when the GND lead wire (#1020) is replaced.)



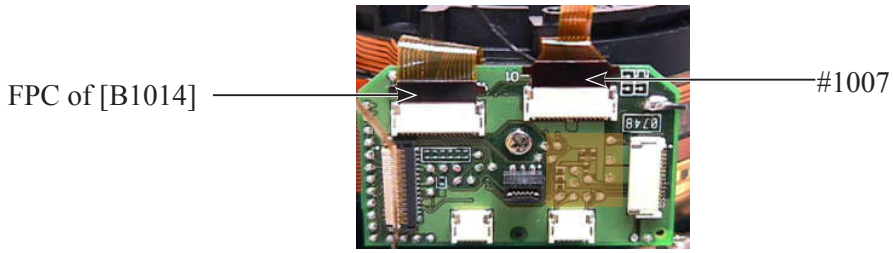
・Adhere the tape [TA-0020 (8×8mm)] to the main PCB unit (B1001), [only when the main PCB unit (B1001) is replaced].



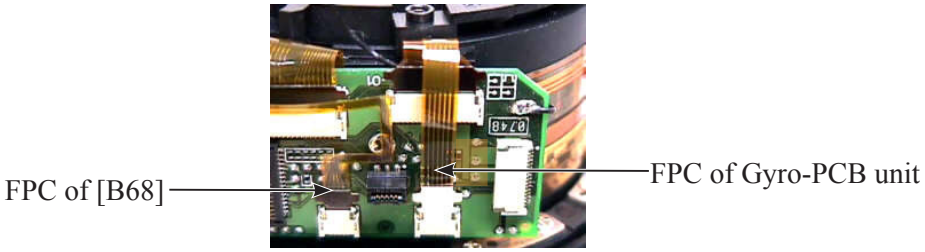
・Mount the main PCB unit (B1001) by fitting the protrusion of the fixed ring unit in the hole of the main PCB unit (B1001), then tighten the two screws (#126).



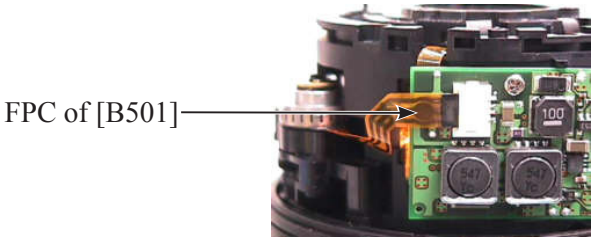
・Connect the FPC of the relay-FPC unit (B1014) and the zoom encoder FPC (#1007) to connectors.



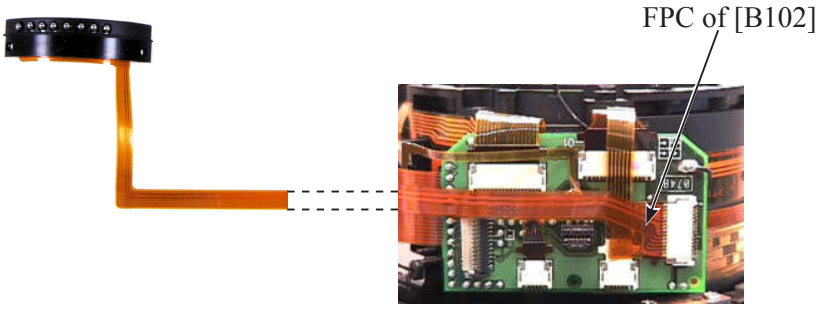
・Connect the FPC of GMR unit (B68) and the FPC of Gyro-PCB unit to connectors.



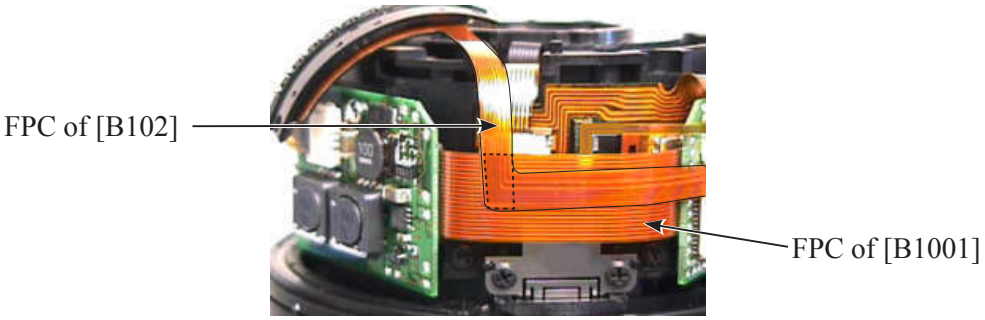
・Connect the FPC of SWM unit (B501) to the connector.



・Connect the FPC of the contact unit (B102) to the connector.

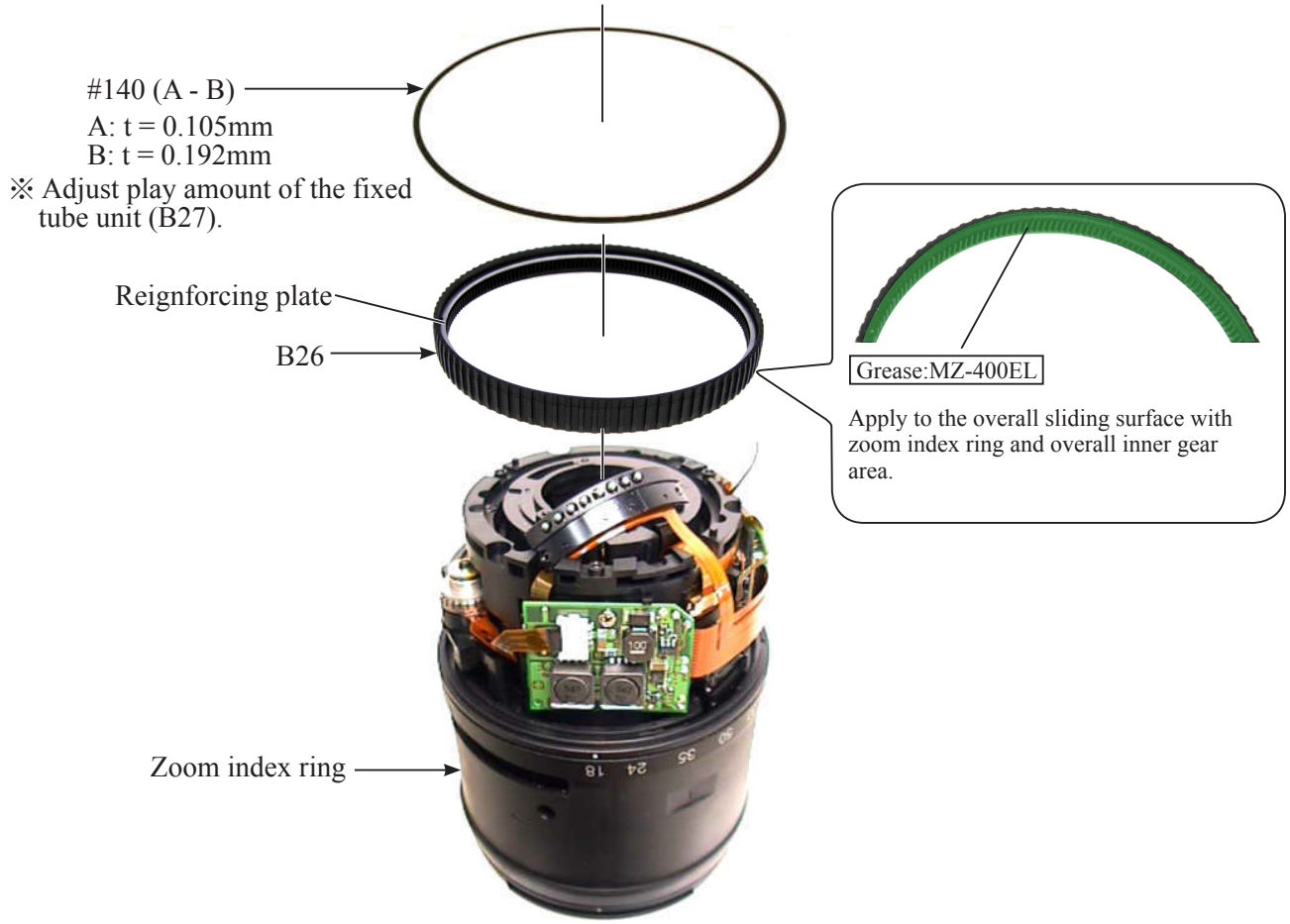


・Peel off the backing paper of the FPC of the contact unit (B102), then attach its FPC to the FPC of the main PCB unit (B1001) as below.



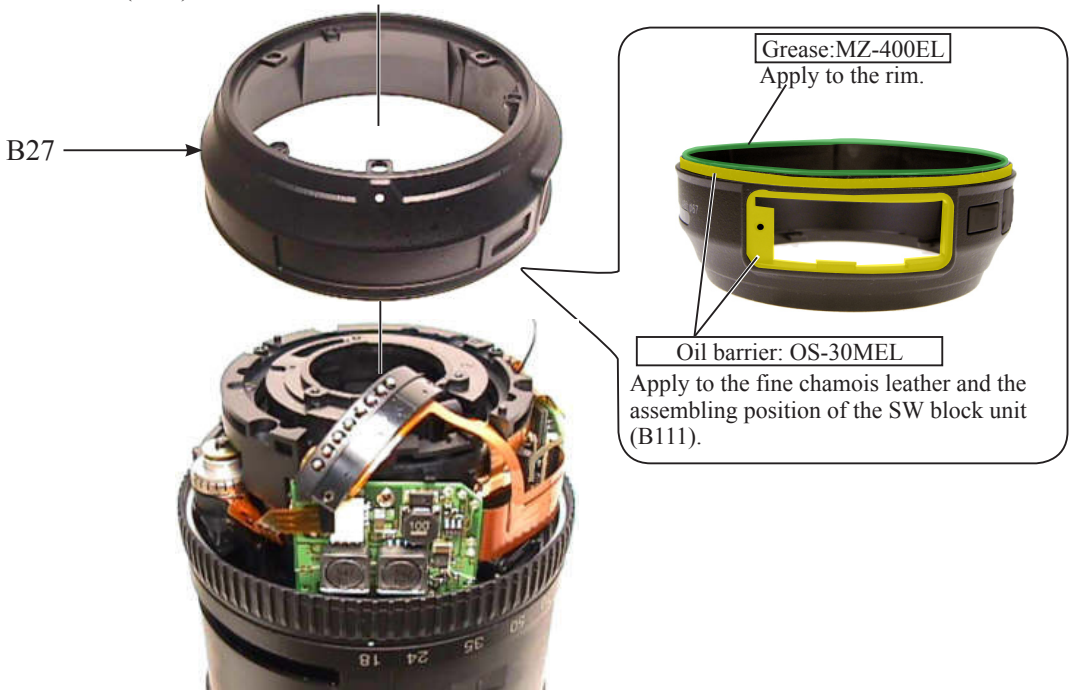
MF ring unit

・Place the MF ring unit (B26) with its reignforcing-plate side facing upward, and mount [B26] and washer (#140) as below.



Fixed tube unit

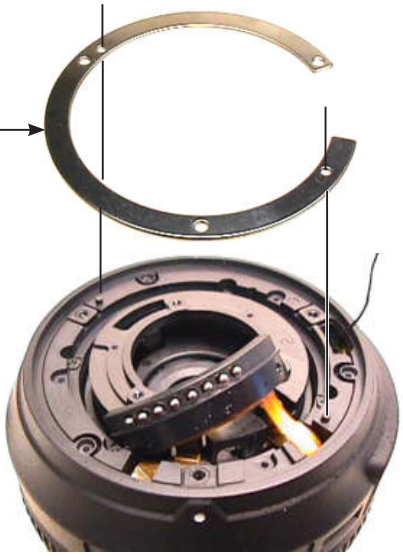
・Mount the fixed tube unit (B27).



Bayonet mount unit

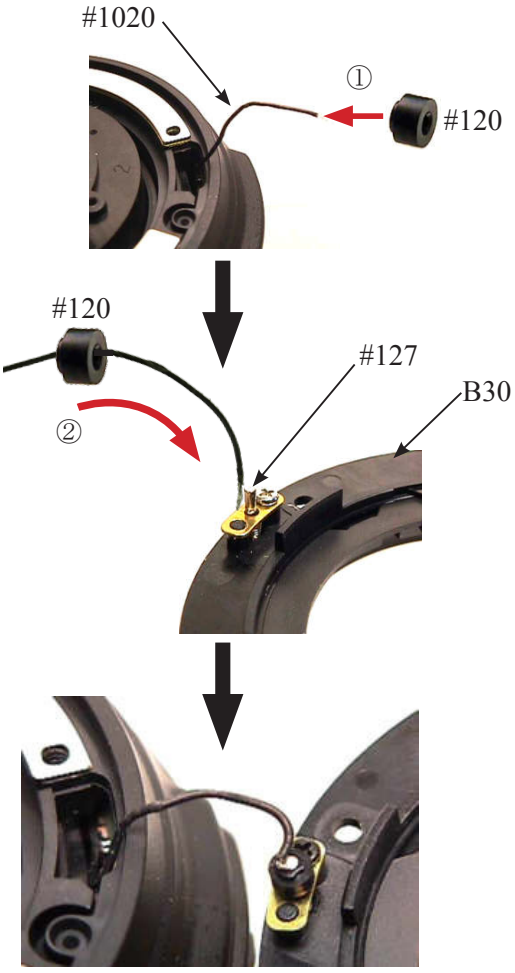
・Mount the washers (#78).

#78 (A-I)
A: t = 0.05mm
B: t = 0.06mm
C: t = 0.07mm
D: t = 0.08mm
E: t = 0.09mm
F: t = 0.1mm
G: t = 0.2mm
H: t = 0.3mm
I: t = 0.5mm
※ F.F.D adjustment washer



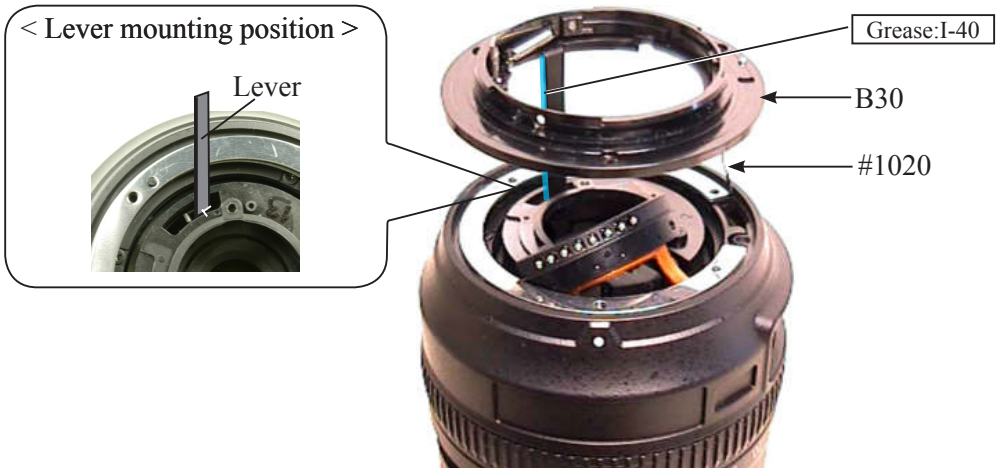
・First, place the roller (#120) with its larger external diameter facing the bayonet mount side and pass the GND lead wire (#1020) (which comes from the main PCB, out from the hole as above), through the hole of the roller [#120]. (ref. Below ①)

Then, put the other tip of the GND lead wire (#1020) at the position of the GND pin (#127) of the bayonet mount unit (B30), and fit the roller with [#127] by kind of pinching in the wire as below. (ref. Below □)

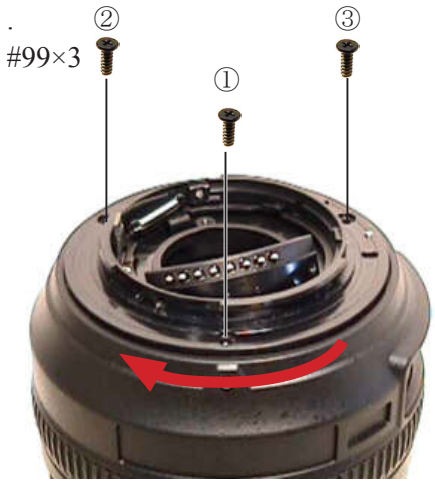


・Mount the bayonet mount unit (B30).

Caution: Be careful NOT to pinch the GND lead wire (#1020) accidentally.



・Position the bayonet mount unit (B30) toward the direction of the arrow, and tighten the three screws (#99) in numeric order from ① to ③ .



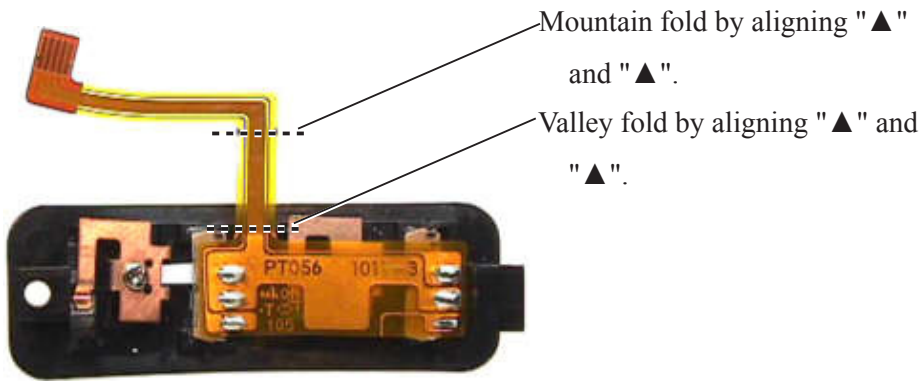
・Tighten the two screws (#105) in numeric order from ① to ② .

・**Inspect the AF contact position by referring to "Inspection of AF-contact pin position" of "Adjustment" on Page A36.**

・**Adjust the aperture lever by referring to "Aperture lever adjustment" of "Adjustment" on Page A38.**

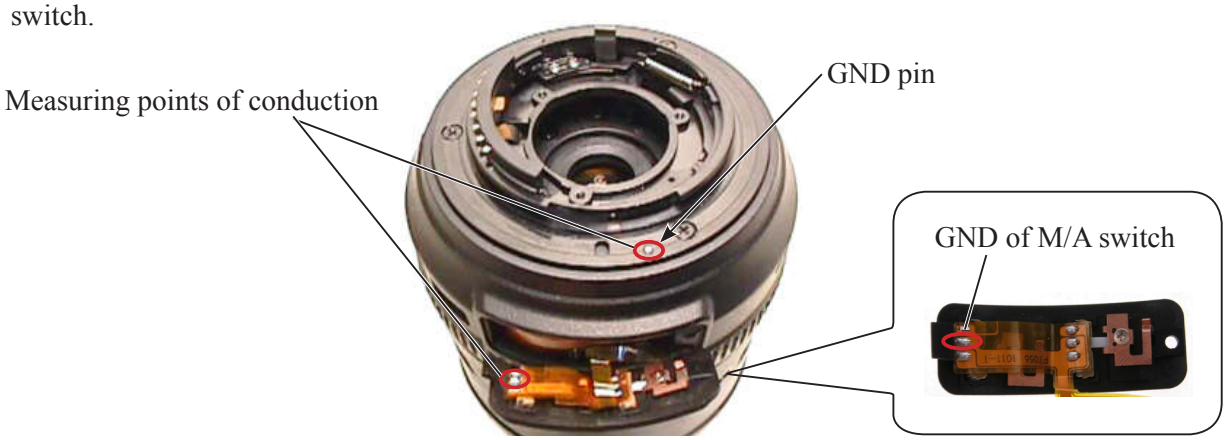
SW block unit

・Bend the FPC of SW block unit (B111) as below.



・Connect the SW block unit (B111) to the connector.

・Check the conduction between the GND pin of the bayonet mount unit (B30) and GND line of the M/A switch.



Standard value : 0.5Ω or less

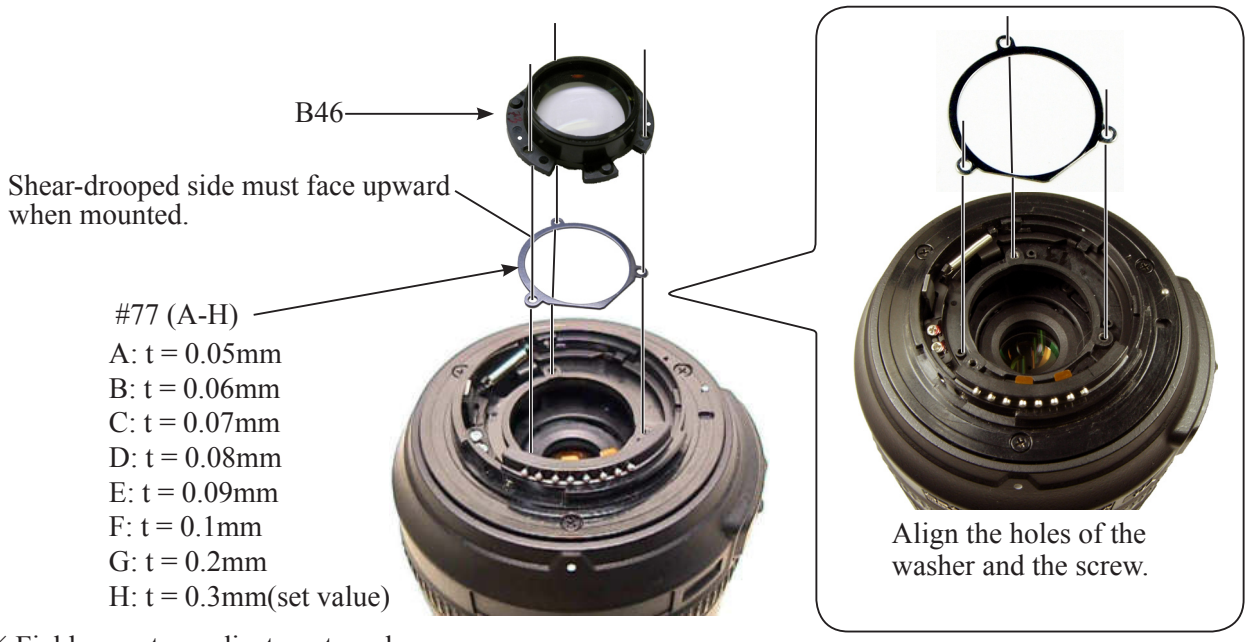
・Mount the SW block unit (B111), and tighten the screw (#115).

5th lens group unit

Caution: Whenever the 5th lens-G unit is removed, lens alignment work will be necessary. So do NOT remove this lens-G unit at service facilities where the alignment work can not be carried out. When the 5th lens-G unit or 3-4 lens-G unit is replaced, the field curvature adjustment will be necessary. For the lens alignment and field curvature adjustment, refer to "Lens optical alignment" of "3. Adjustment" on Page A42.

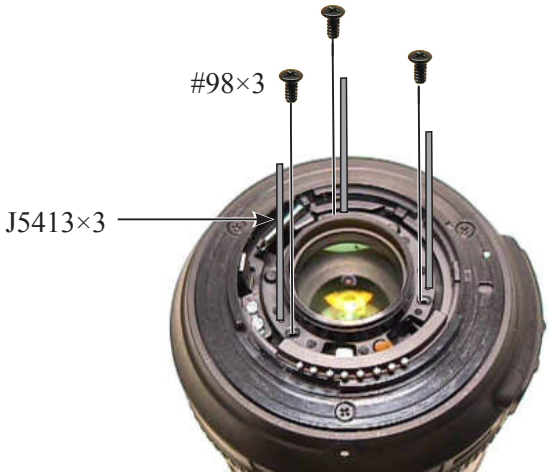
・Set the zoom ring unit (B37) to the WIDE-end.

・Mount the washer (#77) and 5th lens group unit.



※ Field-curvature adjustment washer

・Insert the three reference pins (1mm) (J5413) in the reference holes next to the screw holes, and tighten the three screws (#98).



・Remove the three reference pins (1mm) (J5413).

2nd lens group unit

Caution : "R1 surface" of the 2nd lens-G unit (B2042) is aspheric lens.
Therefore, if dusts are attached to the lens surface of the 2nd lens group unit (B2042), blow them away with a blower as much as possible. If impossible, dip a wiping cloth (Savina Minimax) a little in ethanol, and wipe the surface lightly.

・Set the zoom ring unit (B37) to WIDE-end.

・Mount the focus sliding-frame fixed ring of the 2nd lens-G wrench (J11363). Then, turn it around until the two protrusions (of the focus sliding-frame fixed ring) are fit in the two cutouts of the focus sliding frame (#56).

Note: When the two protrusions (of the focus sliding-frame fixed ring of [J11363]) are fit in the two cutouts of the focus sliding frame (#56), the fixed ring is fastened to the lens barrel each other, so they can not be rotated.

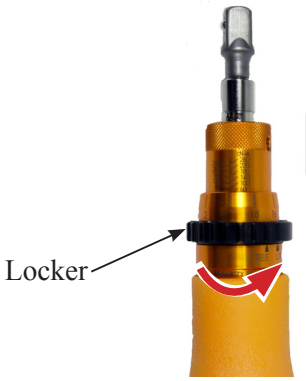
・Based on the below, set the torque of the torque driver (J11364) to "60cN・m".

Note: Refer to the supplied operating instruction of torque driver (J11364) for details.

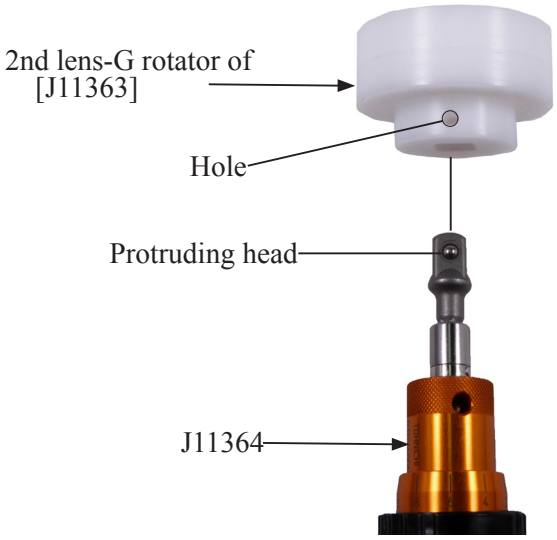
① Turn the locker in the direction of the arrow to unlock it.

② While holding the knurled part by the right hand, turn the grip by the left hand so that the minor scale showing "0" and the major scale showing "60" can be seen.

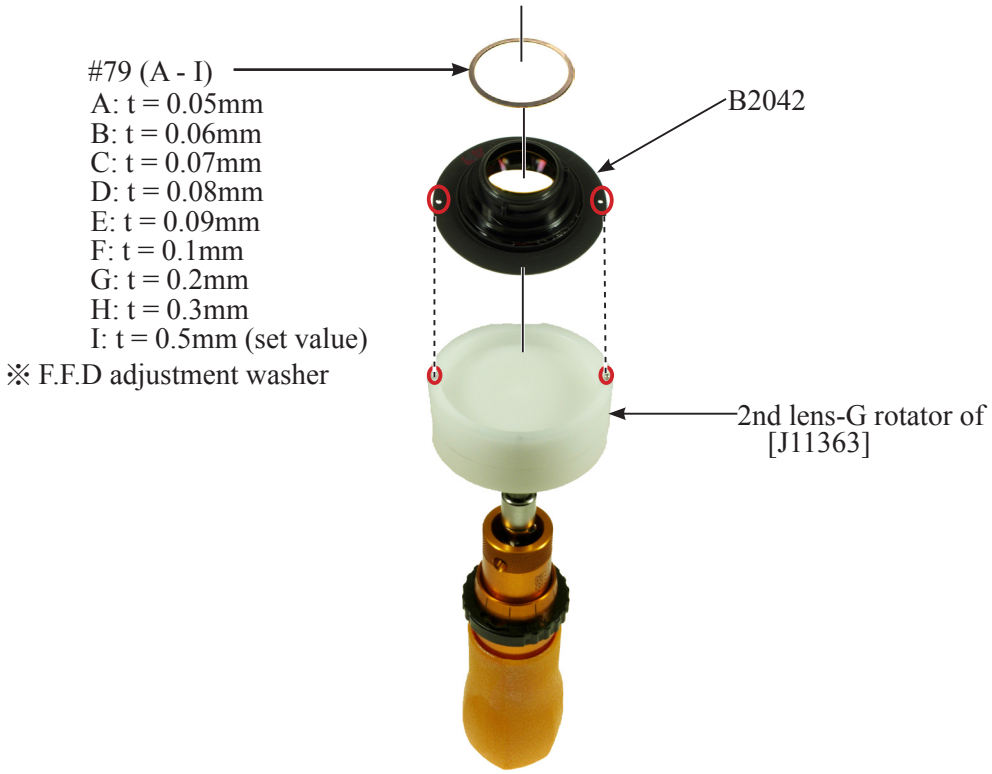
③ Turn the locker in the direction of the arrow to lock it.



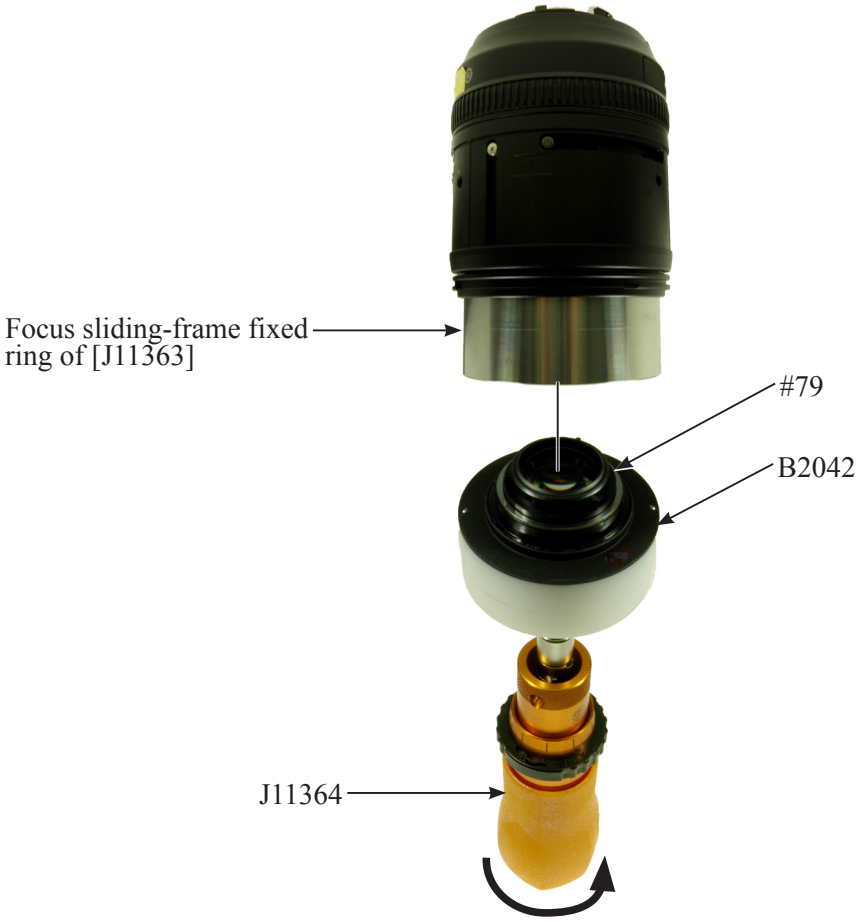
・Mount the 2nd lens-G rotator of the wrench (J11363) on the torque driver (J11364) by fitting the protruding head of [J11364] in the hole of the rotator.



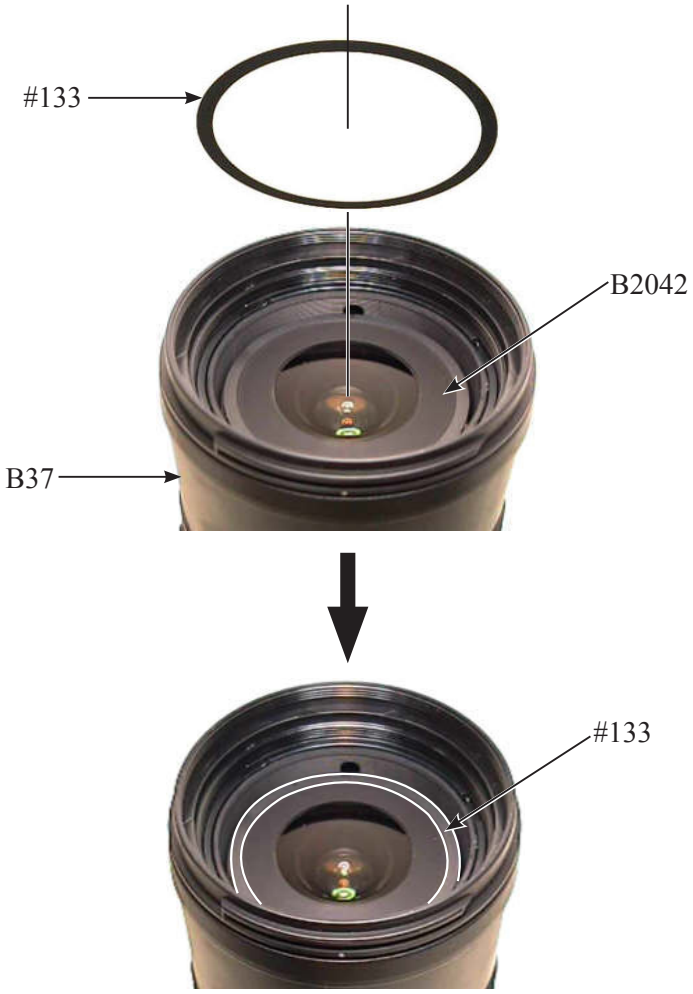
・Fit the two protrusions of the 2nd lens-G rotator of the wrench [J11363] in the two holes of the 2nd lens-G unit (B2042), then assemble the 2nd lens-G unit (B2042) and washer (#79) as below.



・While the focus sliding-frame fixed ring of [J11363] and the lens barrel are fixed as below, turn the torque driver (J11364) until it clicks, then assemble the 2nd lens-G unit (B2042) and washer (#79) as below.

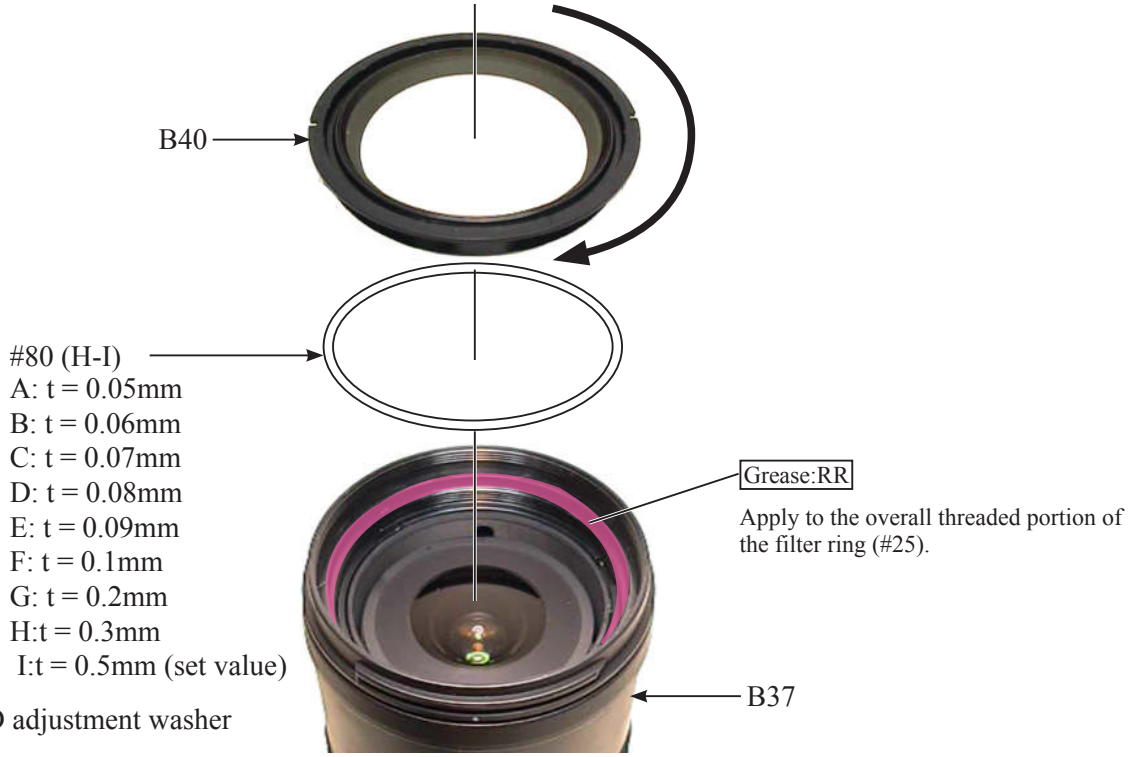


・Adhere sheet (#133) on 2nd lens group unit (B2042).



1st lens group unit

・Set the zoom ring unit (B37) to TELE-end. Then, mount the washer (#80) and 1st lens group unit (B40).

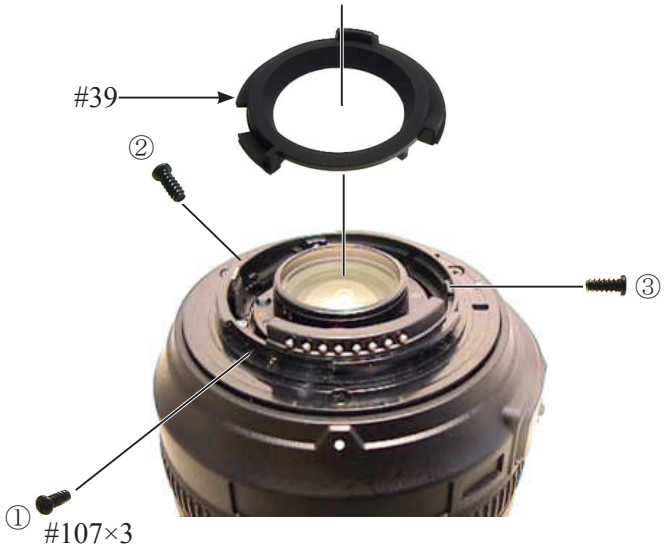


・**Make the F.F. D adjustment by referring to "Adjustment of F.F.D (T, W / Back focus) of "Adjustment" on Page A39.**

・Set the zoom ring unit (B37) to WIDE-end, and attach the sheet (#48) to 1st lens group unit (B40).

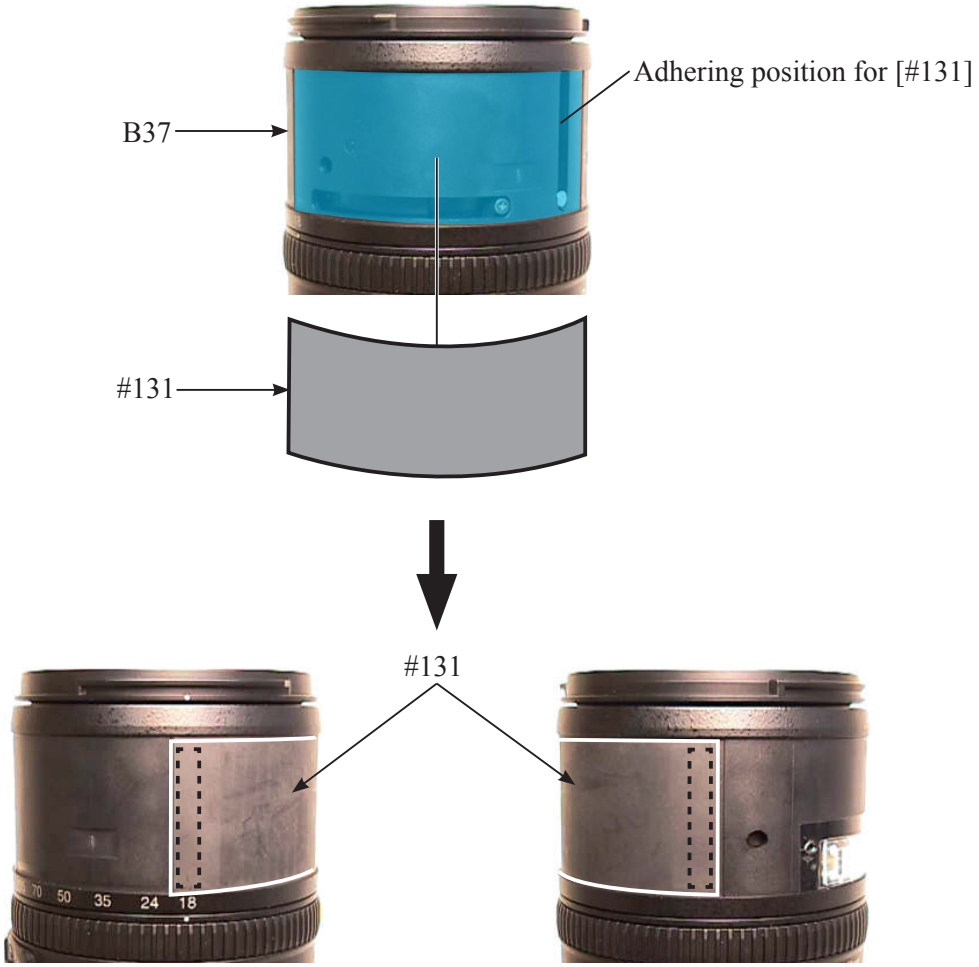
Rear cover ring

・Mount the rear cover ring (#39). Then, tighten the three screws (#107) in numeric order from ① to ③ .

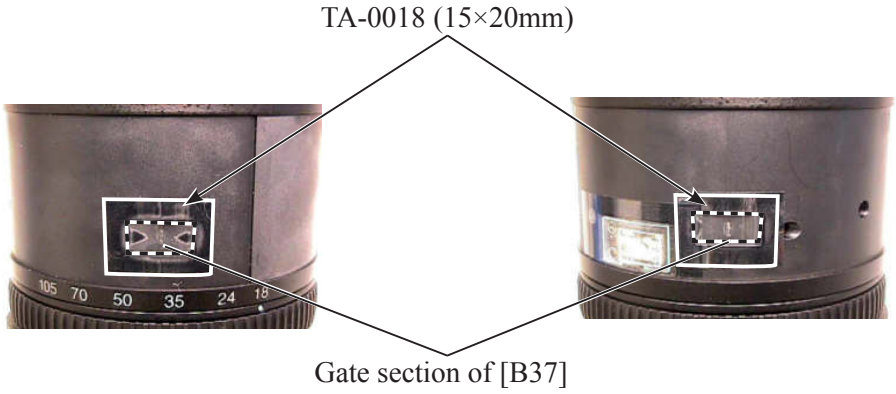


Sheet / Zoom rubber ring

・Peel off the backing paper of the sheet (#131), then adhere [#131] to the zoom ring unit (B37).



・Attach the two tapes [TA-0018 (15×20mm)] to the two gate sections of the zoom ring unit (B37).



・Mount the zoom rubber ring (#35).

VR name plate / Name plate

・Peel off the backing paper of the VR name plate (#71), and adhere [#71].

・Peel off the backing paper of the name plate (#72), and adhere [#72].

3.Adjustment

Adjustment during assembly

Inspection and Adjustment of GMR output waveform

When the GMR unit is disassembled or replaced, be sure to make inspection and adjustment.

1. Device

・Single-output rated voltage power-supply　1 unit : 5V , 100mA
・Oscilloscope　1 unit
・GMR-output inspection tool　1 unit (Self-made tool)

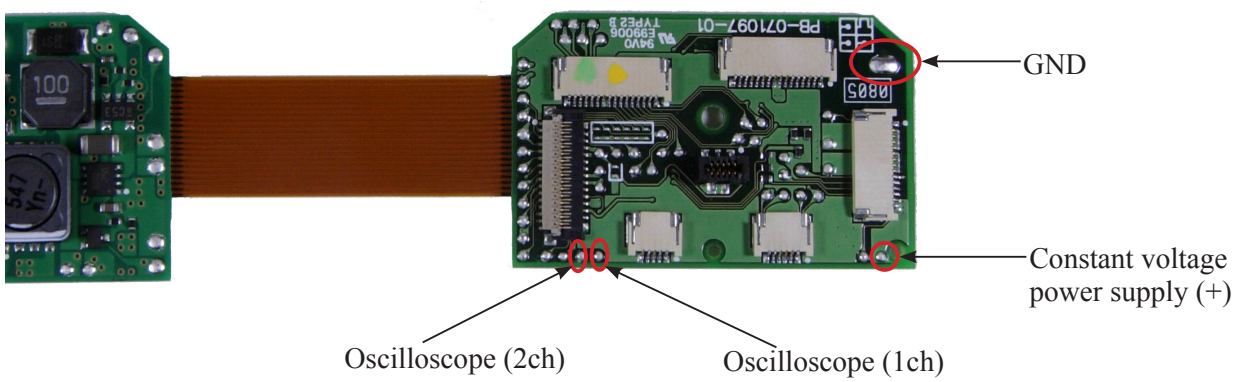
Refer to the below "2. Creation of GMR-output inspecting tool" (on Page A33) for details.

Caution: In case the relay-FPC contact surface is stained, eroded, or oxidized, it will cause a failure of conduction between the GMR output inspection tool and the relay-FPC contact. So polish the contact and connect them.

2. Creation of GMR-output inspecting tool

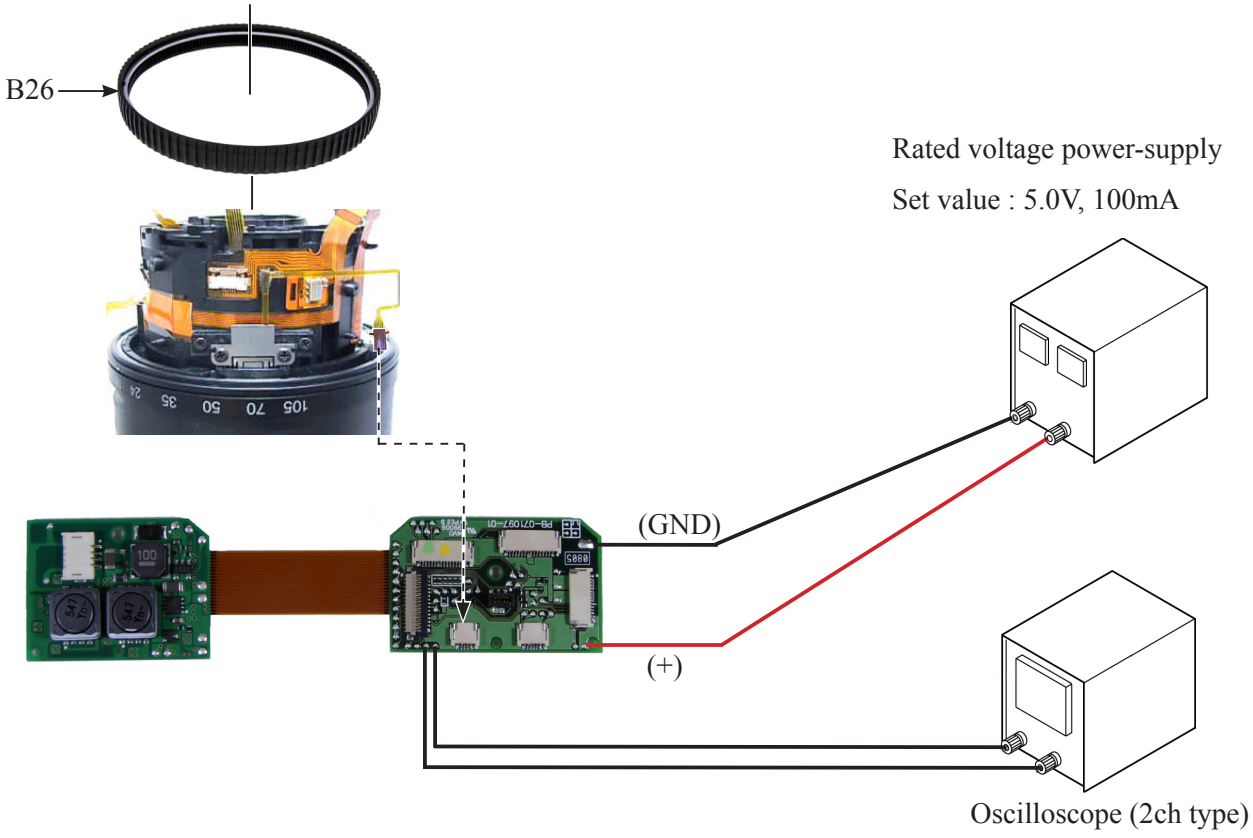
For inspecting and adjusting the GMR output waveform, creating a self-made tool by using the main PCB (1S020-557) is necessary as follows:

Solder the wires on the four patterns of the PCB as follows.



3. Preparation of the lens

・Mount the MF ring unit (B26) to the fixed tube, which has GMR unit assembled, then connect to each measuring instrument.



4. How to inspect and adjust:

・Confirm that the electric current and voltage of the connected rated voltage power-supply are set values (5.0V, 100mA). then turn it ON.

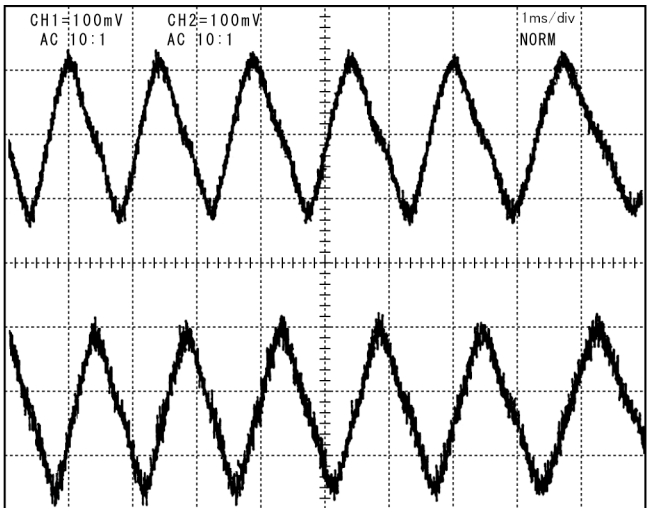
・Set the oscilloscope, and turn the MF ring unit (B26) with hand.

・In case large waveform-noise 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.



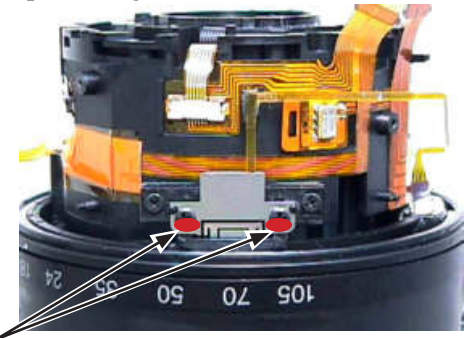
Oscilloscope setting	
V/Div(ch1)	100mV
V/Div(ch2)	100mV
Coupling	AC
Time/Div	1ms/div
Trigger Mode	NORMAL
Trigger Coupling	AC
Trigger Source	CH1
Trigger Position	+4div
Trigger Type	EDGE
Trigger Level	0V
INPUT(ch1)	AC
INPUT(ch2)	AC

Standard: Amplitude of all pulses/waveforms is 100mV or more.

Caution: Check the waveform by rotating the MF ring unit (B26) all the way around back and forth.

・If there is no problem with the waveform of GMR sensor, remove the MF ring unit (B26). Then apply the adhesive to the head of the two screws (#110) to fix.

If the amplitude of the waveform is less than 100mV, bend the head of the GMR sensor and make the adjustment. Then, check the amplitude again.



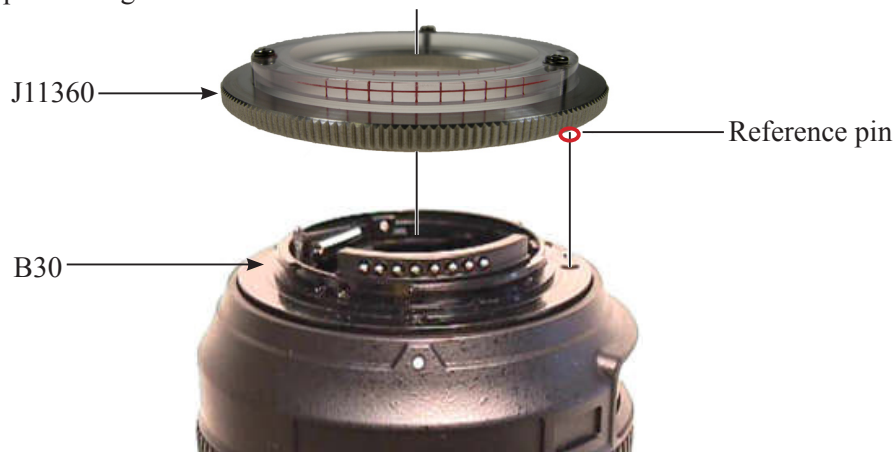
#110×2

Adhesive:Screwlock

Inspection of AF-contact pin position

Whenever the contact unit is removed, be sure to make the below inspection and adjustment.

1.Mount the inspection tool (J11360) on the bayonet mount (B30) by fitting the reference pin of [J11360] in the mount unit positioning hole.



2. Check whether the position of the A-contact pin meets the standard or not.

In case the position of the A-contact pin meets the standard, go to the procedure 5.

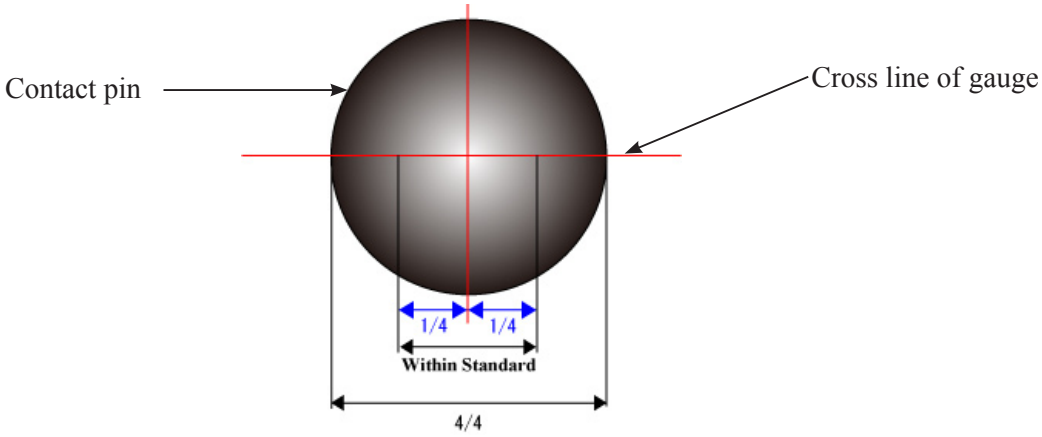
In case the position of the A-contact pin is out of standard, go to the next procedure and adjust it.

【Standard position of Contact pin】

Based on the horizontal cross line, the top of the contact pin must be positioned as below:

Within one-fourth diameter from right to left from the intersecting point of the cross lines.

Caution: To confirm the position of the contact pin, look straight at the each contact pin horizontally from an anterior view.



3. Take out the two screws (#105) of contact unit (B102) and adjust the position of the contact pin to be within the standard. Then, tighten the two screws (#105) in numeric order from ① to ② .

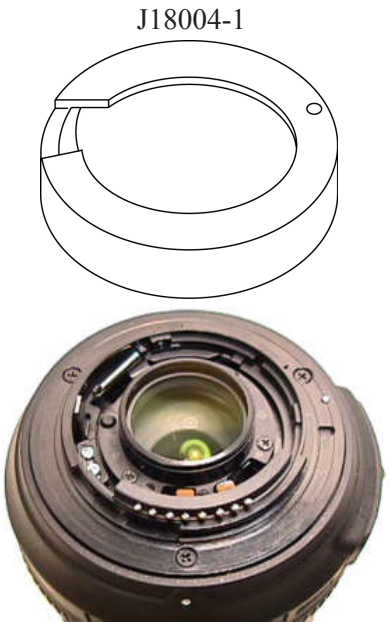
4. By following the procedure from 1 to 2, check that the A-contact pin position is within standard.

5. Check whether the position of the other pins than A-contact pin meets the standard or not.
If the A-contact pin position meets the standard but other contact pins do not, bending or looseness of the contact pins is possible.

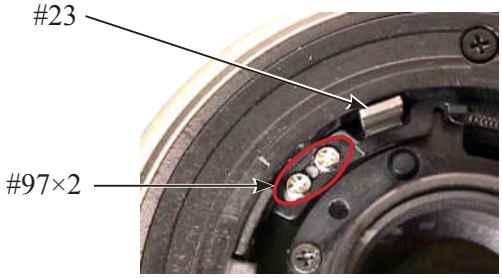
Aperture lever adjustment

・Set the zoom ring to TELE-end.

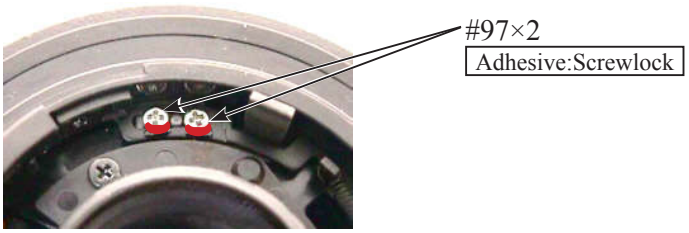
・When the lock pin of [J18004-1] is put into the lock hole of bayonet, confirm that the aperture blades become fully open.



・If the aperture blades open quickly or slowly, adjust the position of aperture lever (#23) with two screws (#97).



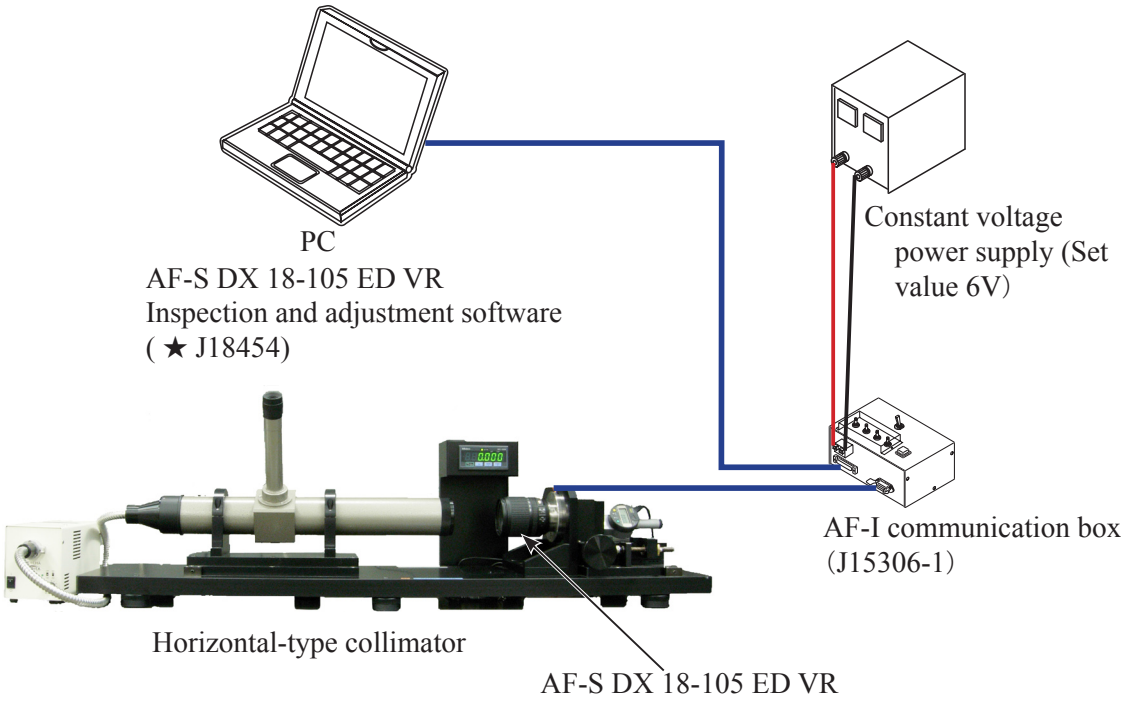
・Apply the screwlock to the two screws (#97).



Adjustment of F.F.D (T,W / Back focus)

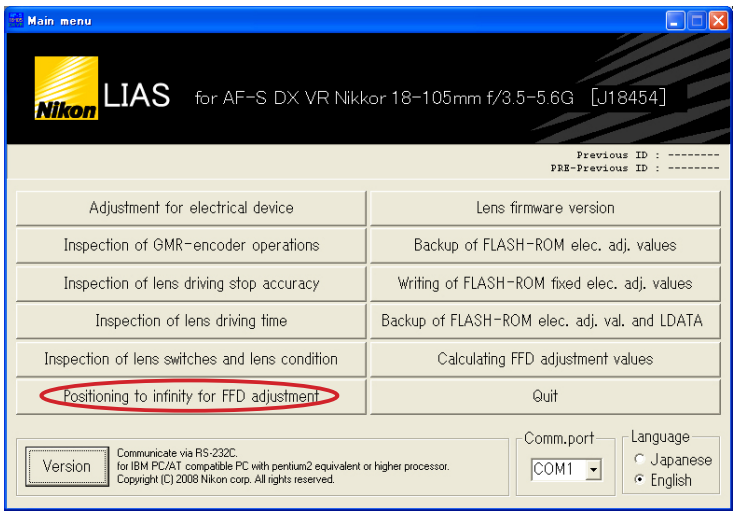
★ : New tool

・Mount the lens on the horizontal-type collimator, and connect PC, communication tool, and constant voltage power supply as follows.

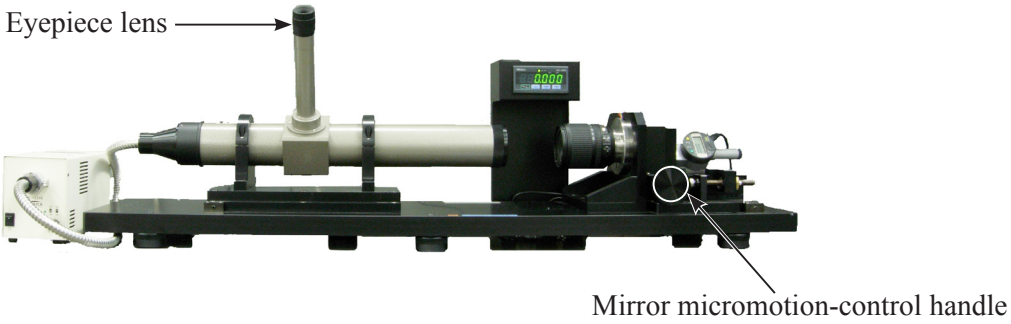


・Start the adjustment software (★ J18454).

・Click "Positioning to infinity for FFD adjustment" on the main menu for performing infinity positioning.

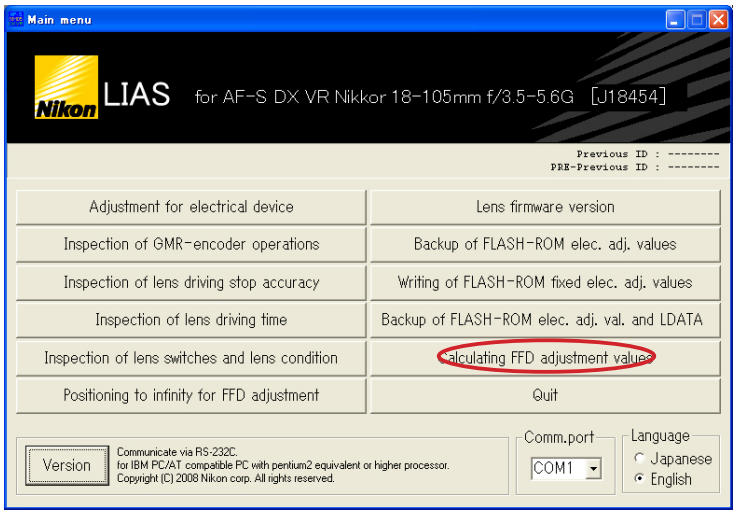


・Looking through the eyepiece of horizontal-type collimator, rotate the mirror micromotion-control handle to adjust focus, then measure focus position at 18mm (WIDE-end), 50mm, 105mm (TELE-end).
The focus position to be measured is the numeric number of boundary line at the moment when the color of cross lines change from green to orange.
If the measured focused position does not meet the standard, take the following step and make the adjustment.

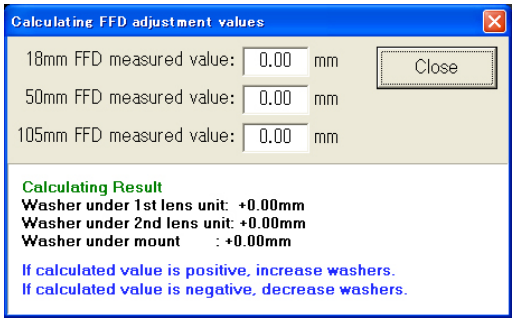


Focal length (f)	Standard (mm)
18mm	From 0 to +0.07
50mm	From -0.25 to +0.10
105mm	From -1.10 to +0.30

・Click "Calculating FFD adjustment values" on main menu.



・Input the focus position which were measured by the horizontal-type collimator at 18mm, 50mm, and 105mm.



・Based on the calculating results, adjust the thickness of the below three washers [washer under 1st lens unit (#80); washer under 2nd lens unit (#79); washer under mount (#78)].
If the result is positive (plus), increase the thickness, while negative (minus), decrease it.

Washer under 1st lens unit (#80): Adjustment washer (ref. Page A29)
Washer under 2nd lens uni (#79): Adjustment washer (ref. Page A26)
Washer under mount (#78): Adjustment washer (ref. Page A19)

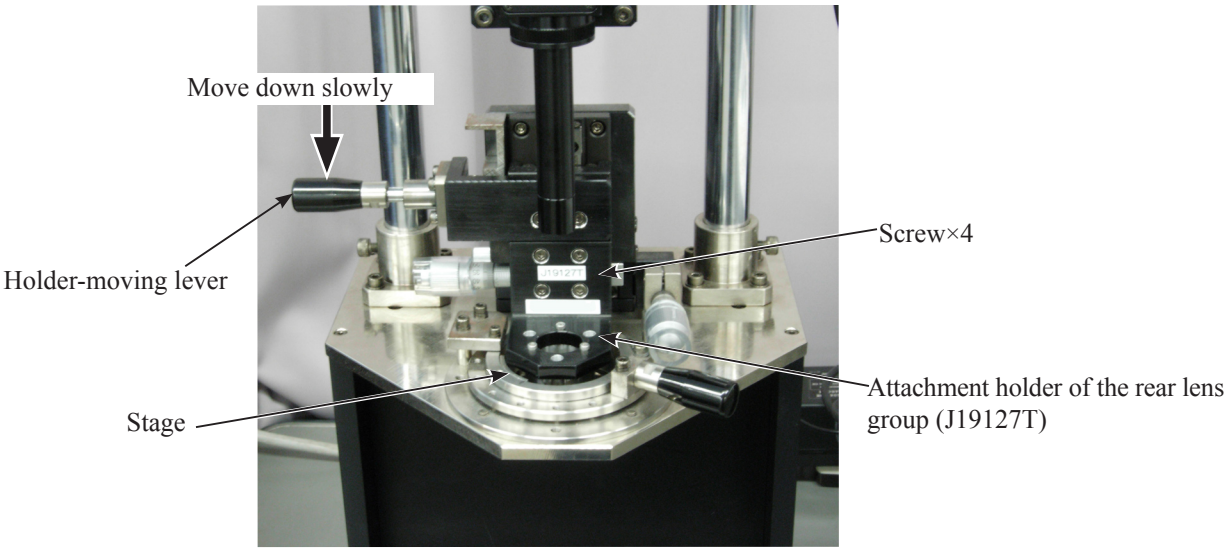
Lens Optical Alignment

Caution : This adjustment is required when the 5th lens group unit is replaced.

1. Preparation of Lens optical alignment equipment

・Fix the attachment holder of the rear lens group (J19127T) on the lens equipment.

How to Fix: Move down the holder-moving lever slowly so that the attachment holder of the rear lens group (J19127T) touches the stage. Then tighten four screws to fix it.



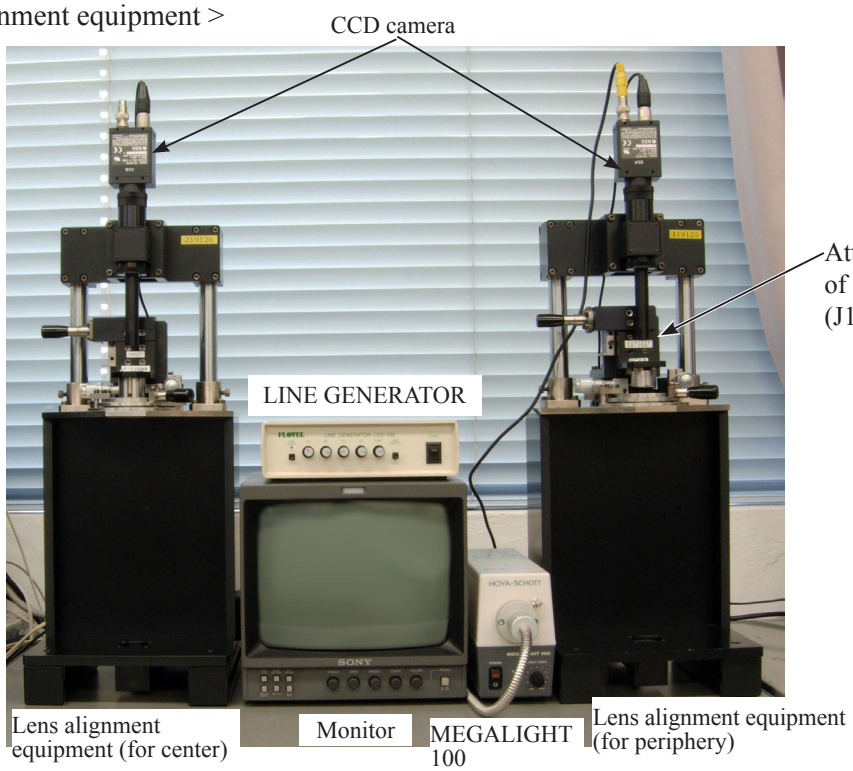
・Create the center positioning tool.

Refer to [Create positioning tool of Rear lens-group holder for lens alignment] (Page A55) for how to create.

・Create cardboards with which "Lens alignment chart" and "Viewers" are fit.

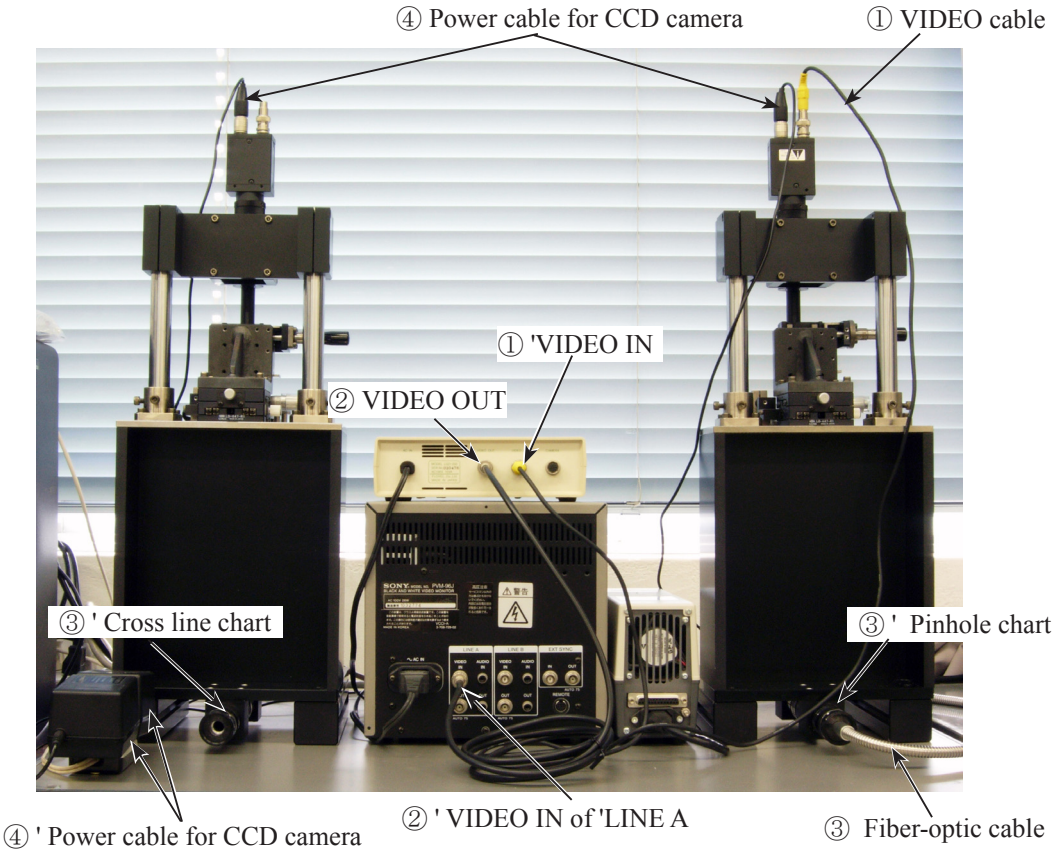
Refer to [Create Setting board of "Lens alignment chart" and "Viewer"] (Page A56) for how to create.

< Lens optical alignment equipment >

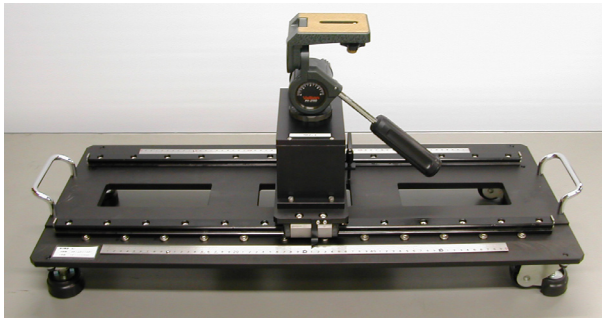


< Back view of Lens optical alignment equipment >

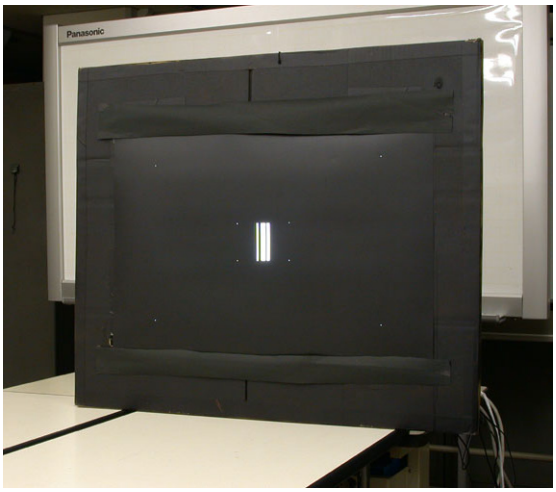
Connect each cable to the appropriate equipment with the same number. (e.g. Connect up ① to ① ')



< Chart shooting equipment for lens alignment >



Slide rail for lens alignment equipment



The chart is embeddied in cardboards.

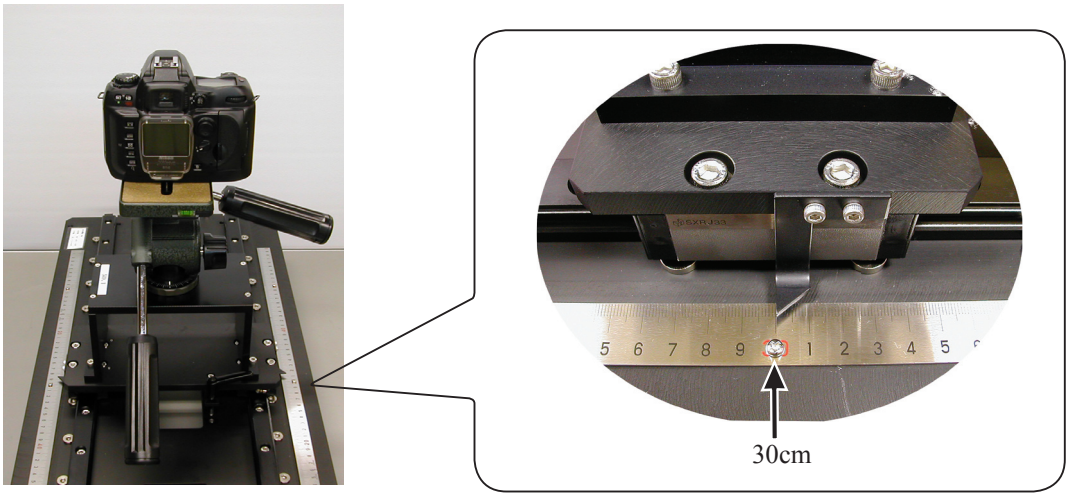
2. Chart shooting for the rear lens group alignment

Caution: Be sure to use the reference pin (1mm) (J5413) and assemble the 5th lens-G unit into the lens barrel. (ref. Page A23)

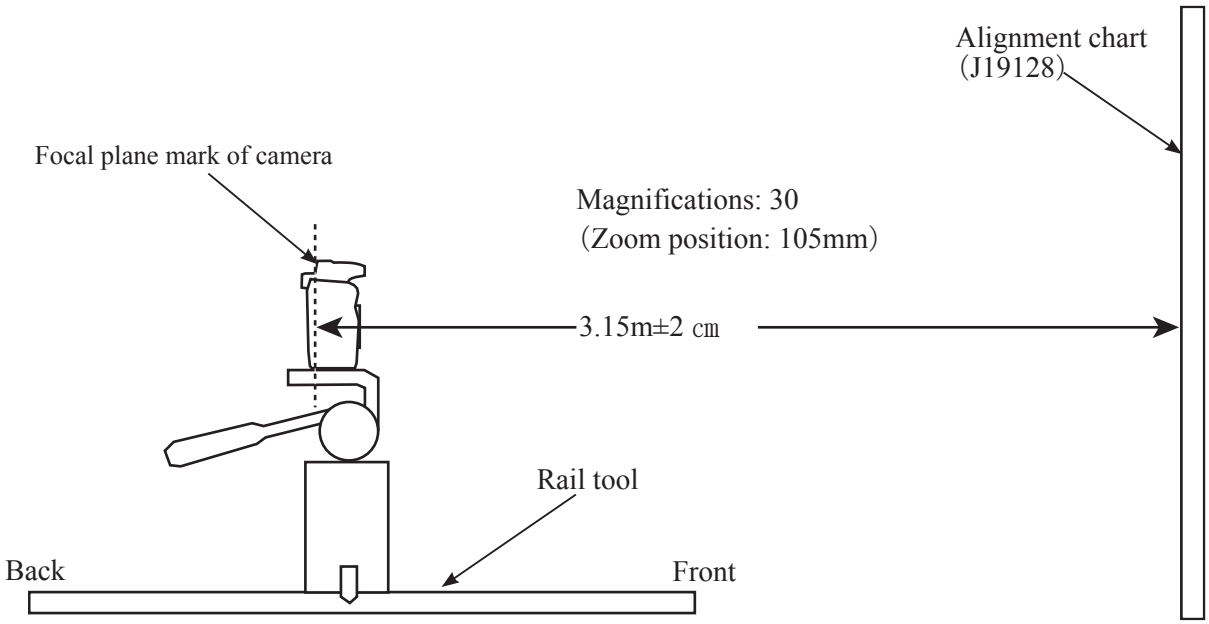
・Prepare a camera (D200). Set the shutter speed to "M1/30", aperture to "full open", and the focus mode to "S". On the shooting menu, set "Image Quality" mode to "RAW", "RAW compression" to "NEF(RAW)", "WB" to "Preset" and "ISO" to "200".
△ (Addition)

・Set the VR mode of the lens to "OFF".

・Set up the camera (D200) on a tripod on the slide rail. Set the indication pointer of the tripod to 30 cm.



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



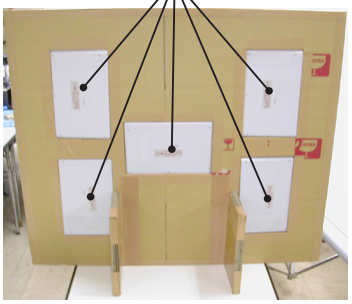
サービス計画課 M

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

Caution: If the batteries of viewers are exhausted causing decreased brightness, the shooting data cannot be obtained correctly.

Viewer× 5 pcs.

Front



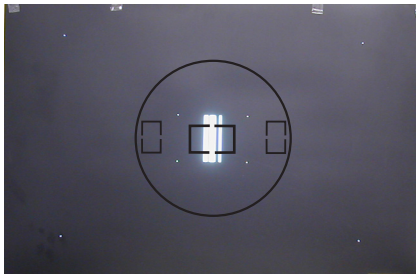
Back

・Attach the suspected lens to the camera (D200). Set the A/M change SW to "M", the zoom ring to "105 mm", and the focus ring to "infinity".

・Set the A/M change SW of lens to "A".

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

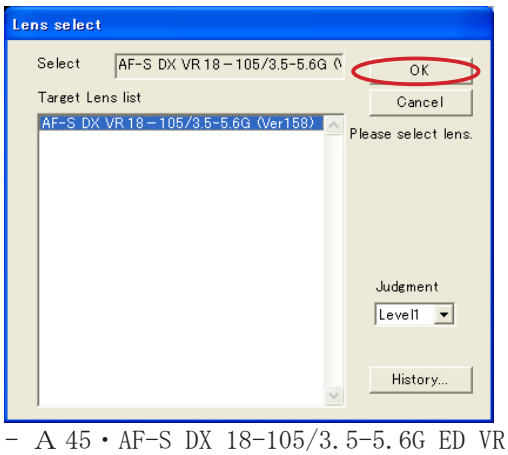
・Adjust the tilt of the slide rail to make the three chart lines position in the center of the viewfinder, when the tripod is slid all the way to the front and back.



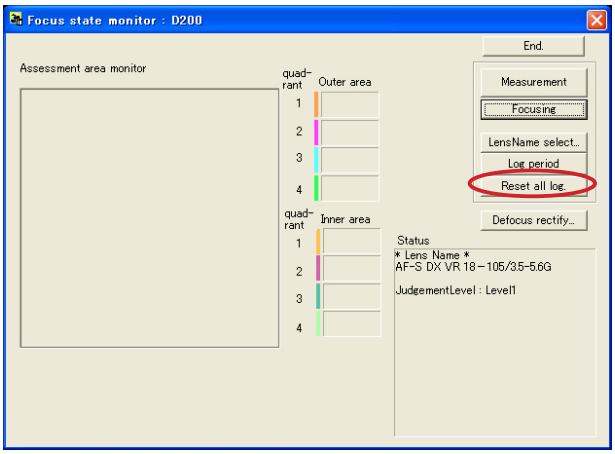
・Connect the PC and camera via USB cable (Camera setting for USB: PTP).

・Start the adjustment software (LWM_AFSDX18_105.exe).

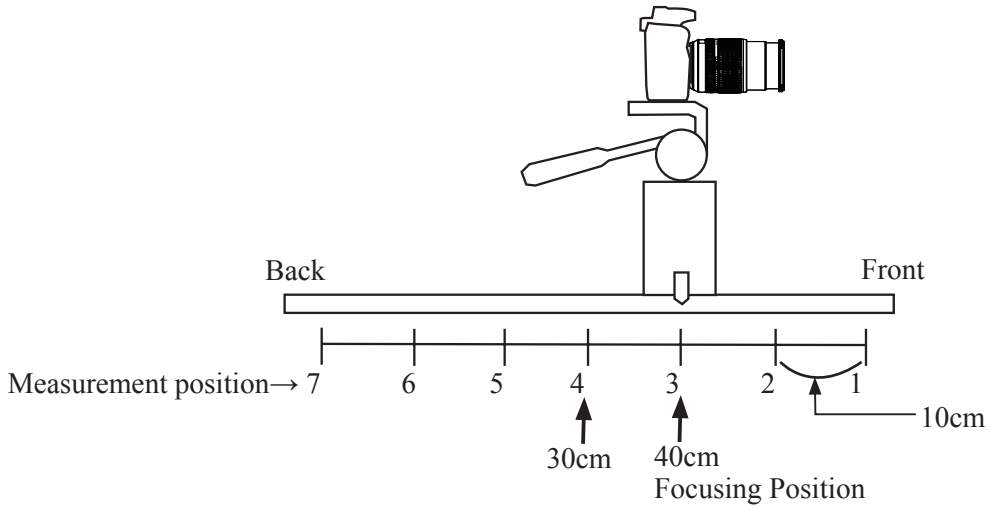
・Click "OK".



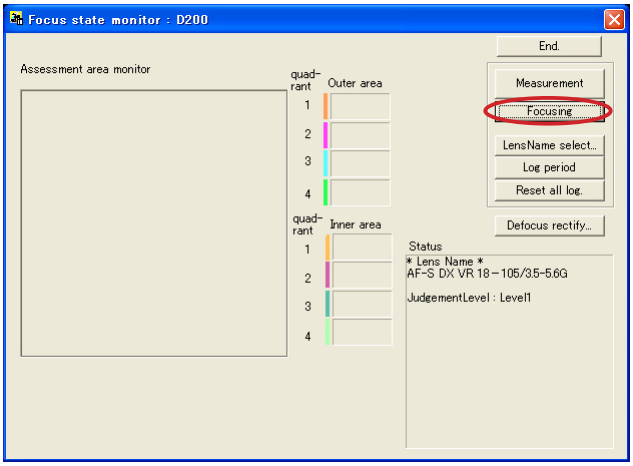
・Click "Reset all Log".



・Slide the tripod by "10cm±0.1cm" to the front, and darken the room.

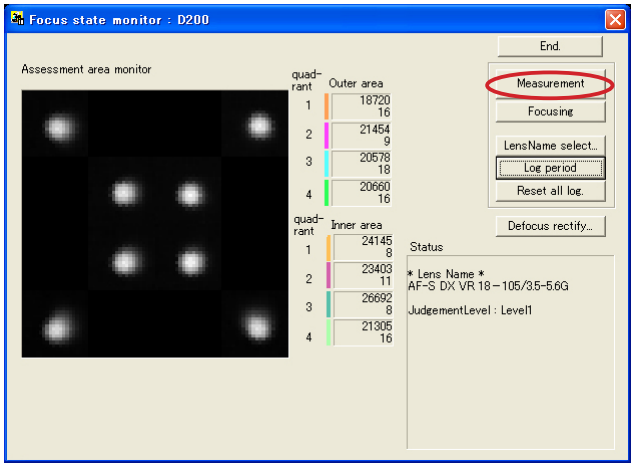


・Click "Focusing". The camera AF will be activated and the shutter will be released.



・Set the A/M change SW of lens to "M".

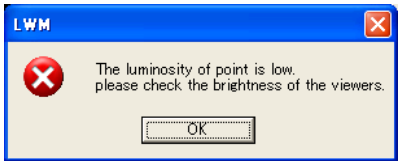
・Slide the tripod by "20±0.1cm" to the front, and click "Measurement".



・When the shutter is released, slide the tripod by "10±0.1cm" to the back, and click "Measurement" again.

・Repeat this operation (by sliding the tripod in increments of "10±0.1cm" and clicking "Mesurement") seven times (totalling 60cm of the slid distance).

Caution: 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.



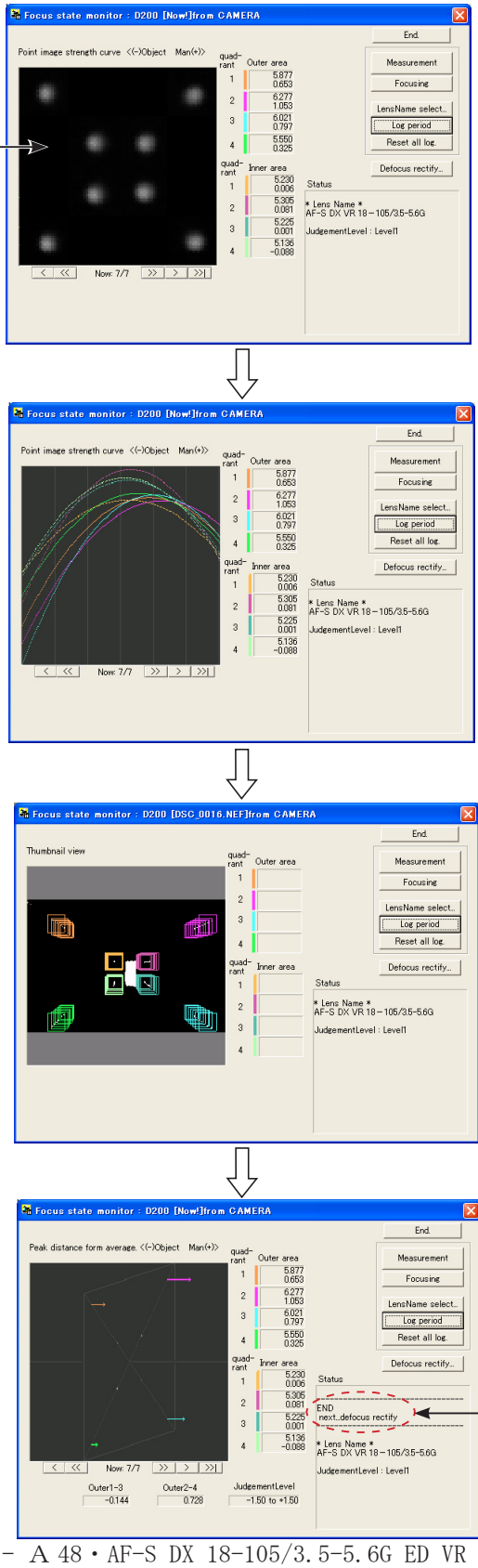
Caution: When the below warning is given, recheck that the Quality mode of the camera is set to RAW.

・After the seven measurements, point the cursor to the confirmation screen of the software. Click it three times.

If "Information" displays "END", the lens optical alignment is completed. When the 5th lens-G unit or 3-4 lens-G unit, go on to [3. Field curvature adjustment] (on Page A49).

If "Information" displays other than "END", go to the next [5. Rear lens-group alignment] (on Page A51) to readjust.

Confirmation screen



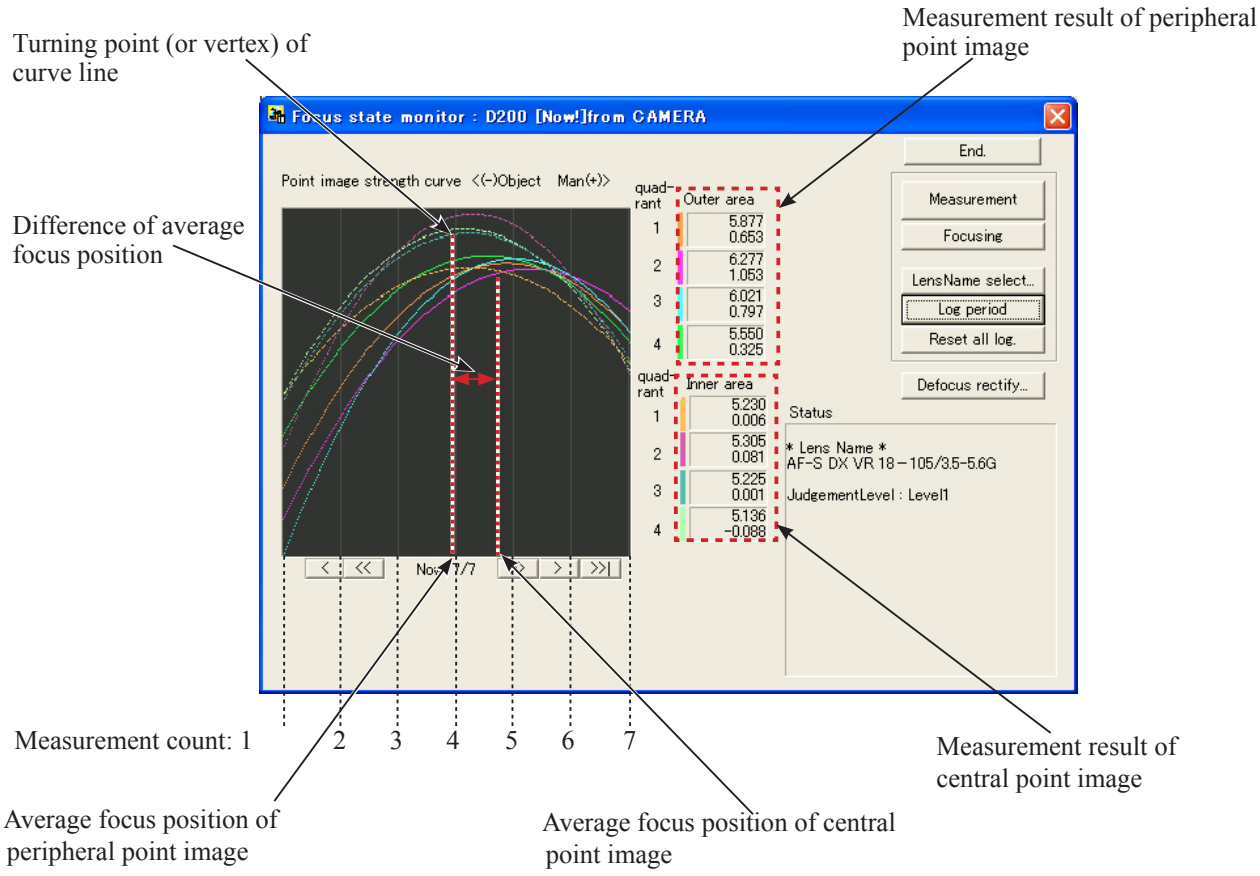
Information display

3. Field curvature adjustment

When the 5th lens-G unit or 3-4 lens-G unit, check the average focus positions of the central and peripheral point images on the confirmation screen of the lens alignment software.

If the difference of average focus position between the central and peripheral point images shows a distance that corresponds to "1.5-or-more measurement count", adjust thickness of the washer (#77) which is under the 5th lens-G unit so that the above difference becomes "less-than-1.5 measurement count".

Note: The focus position of point image is the measurement count/position (horizontal axis-coordinate) at the turning point (or vertex) of curve line. (see below) So to check the focus position, confirm the average of four points each of central and peripheral point images.

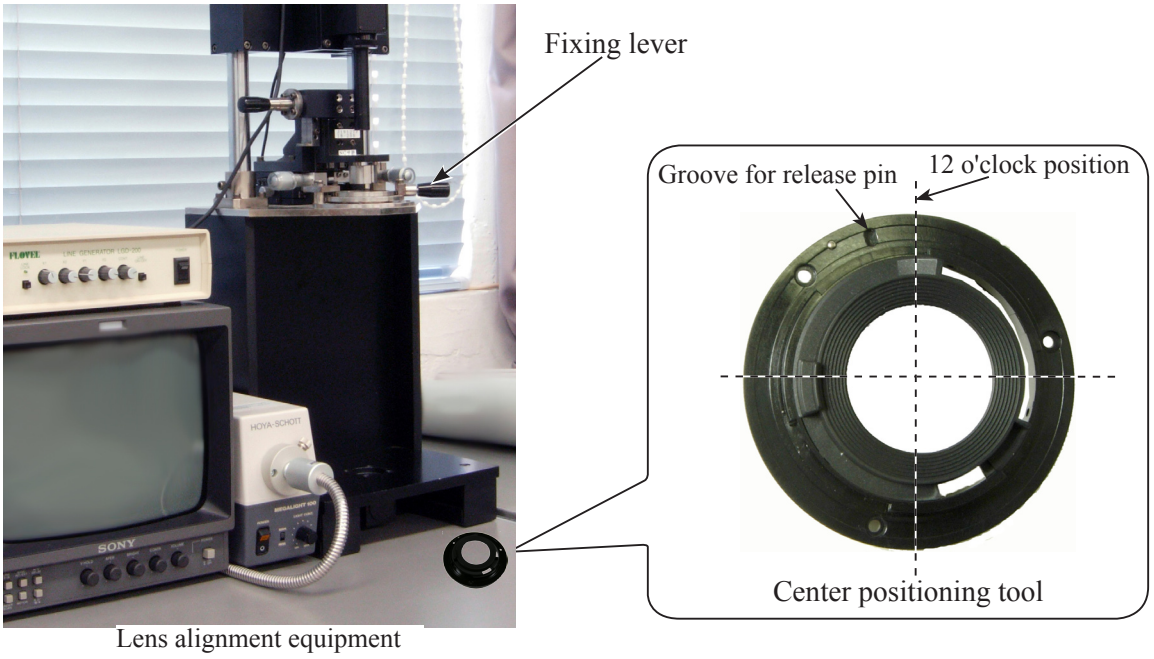


・Go back to [2. Chart shooting for the rear lens group alignment] (Page A44).

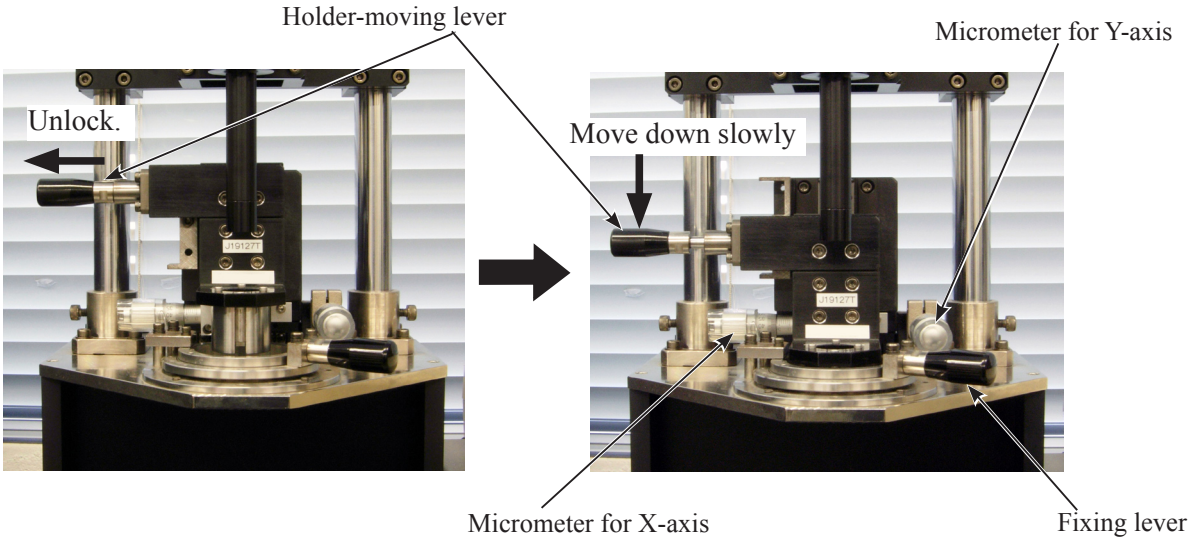
Repeat this procedure of [2. Chart shooting for the rear lens group alignment] (page A44) and [5. Rear lens group alignment] (Page A51).

4. Center positioning of rear lens-group holder

・Mount the (self-made) center positioning tool on the lens alignment equipment (for center) by setting the groove in place slightly to the left (in a 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.



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



・Adjust the attachment holder (J19127T) position by rotating the micrometers for X-axis or Y-axis so that the center of the attachment holder coincides with that of the rear cover ring of the (self-made) center positioning tool.

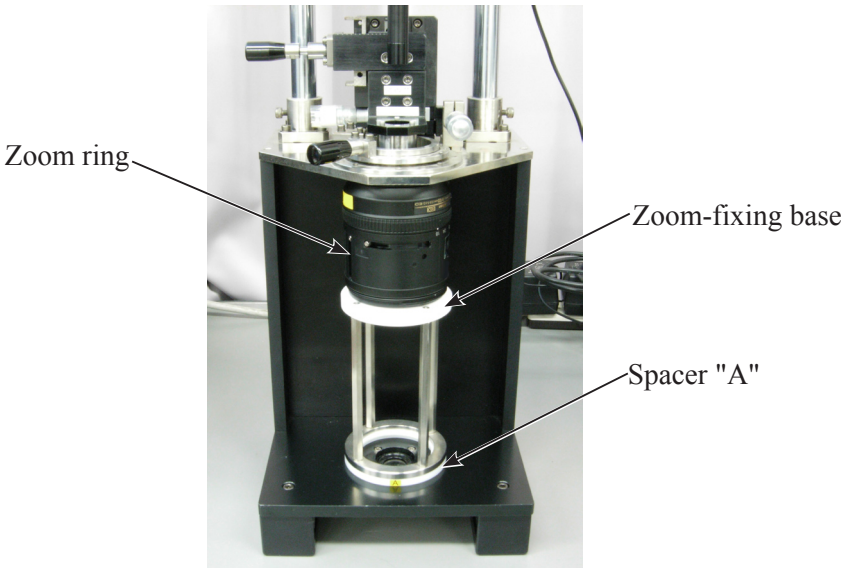
Caution: Without this alignment, the 5th lens may be damaged by the attachment holder.

・Move the holder-moving lever of the alignment equipment upwards, and remove the (self-made) center positioning tool from the equipment by moving the fixing lever rightwards.

5. Rear lens group alignment

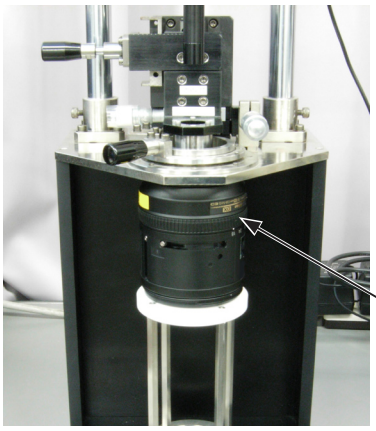
・Mount the lens on the equipment (for periphery).
Refer to [4. Center positioning of rear lens-group holder] (Page A50) for how to mount the lens.

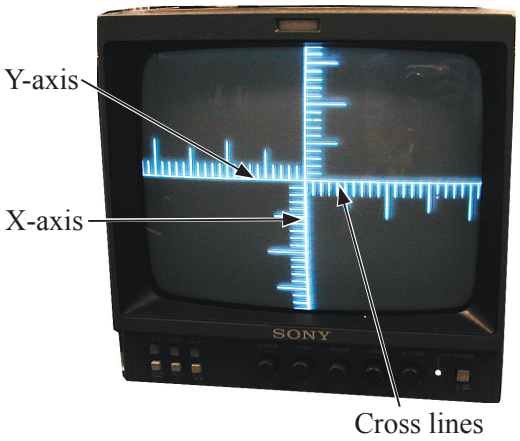
・Set the zoom ring to "18mm" (WIDE-end), and fasten it with the zoom-fixing base and spacer "A".



・Turn ON the monitor, LINE GENERATOR, and MEGALIGHT 100. Then, rotate the "LIGHT CONT." knob of "MEGALIGHT 100" so that the intersecting point of (calibrated) cross lines can be clearly seen on the monitor, and make adjustments by turning the focus ring from INFINITY-end.

Caution: In case the cross lines are tilted, adjust them by turning the chart, which is screwed in the rear tube of the equipment.





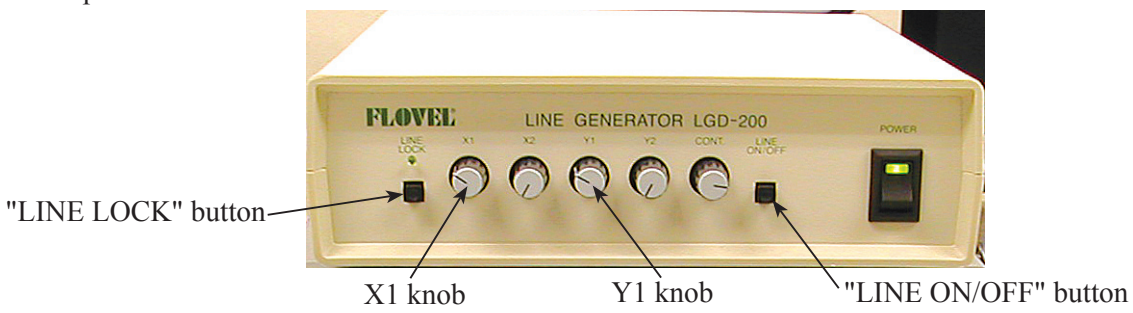
・Unlock the holder-moving lever, and move the holder down slowly by the lever.

Caution: Be careful NOT to damage the 5th lens group by the attachment holder (J19127T).

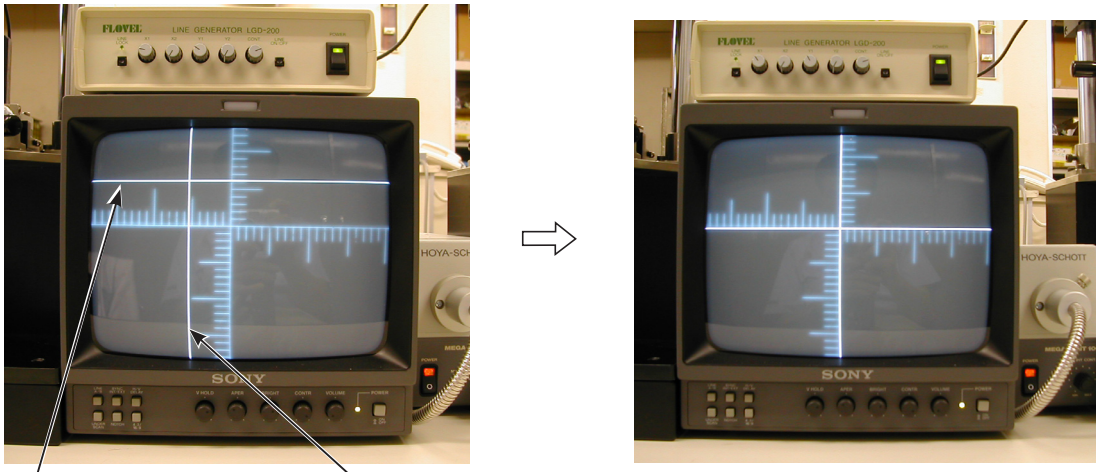
・Press the "LINE ON/OFF" button of LINE GENERATOR. Turn the knobs of "X1" and "Y1" until X- and Y-lines are displayed on the monitor.

Move these X- and Y-lines so that they coincide with the cross lines of the CCD camera.

Then press "LINE LOCK" button to fix these X- and Y-lines.

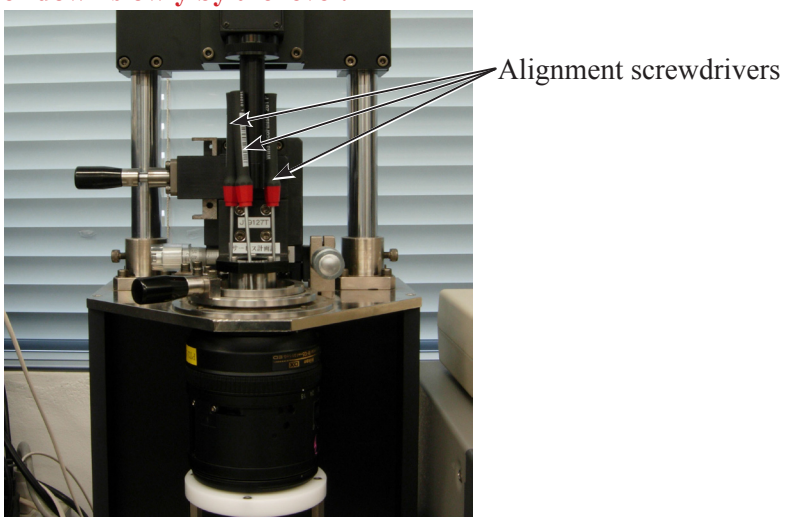


LINE GENERATOR



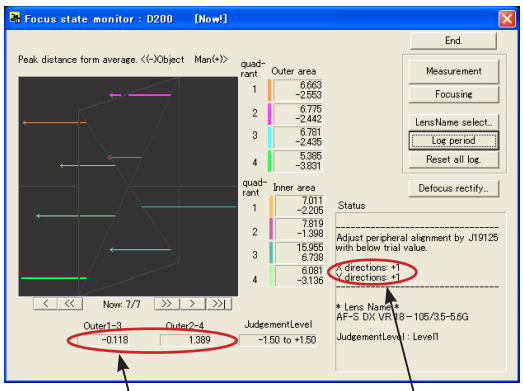
・Insert the three alignment screwdrivers in the screw holes of the 5th lens group unit, and loosen the screws.

Caution: When inserting the alignment screwdrivers, move the holder-moving lever up to lock the holder. Then put them straight down in the screw holes so that the screws can be easily found. After inserting the three alignment screwdrivers, unlock the holder-moving lever, and move the holder down slowly by the lever.



・Rotate the knobs of the micrometer (X and Y axes), and shift the calibrated cross lines based on the result (values) of the chart shooting of the rear lens group alignment.

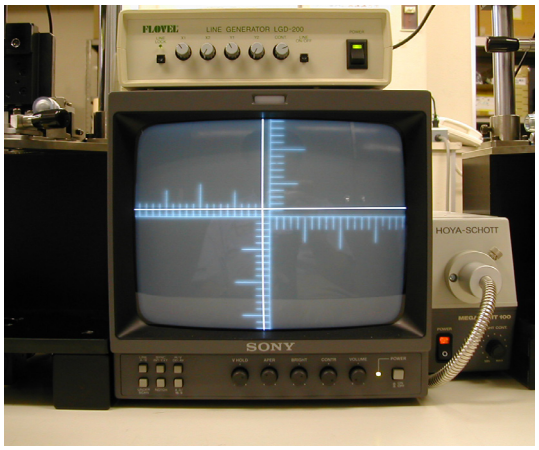
Caution: When the knobs of the micrometer (X and Y axes) are rotated but the calibrated cross lines are unable to move, do not forcedly rotate them.



Result (values)

If more accuracy is preferable even if "END" is displayed, adjust by using the value of "Outer 1-3" as the adjustment amount for "X-axis", while the value of "Outer 2-4" as the adjustment amount for "Y-axis".

< e.g. (X directions:+1, Y directions:-1) >



・After completing the above shift, tighten three screws of the 5th lens group unit with the alignment screwdrivers.

・Remove the alignment screwdrivers from the attachment holder (J19127T).

・Move the holder-moving lever up to lock the holder.

・Check that shift amounts (caused by differences between the calibrated cross lines and the X/Y lines) are equal to the result (values) (1= 1 scale amount of the calibrated cross lines) of "Chart shooting of the rear lens group alignment".

Caution: After fixing the three screws of the 5th lens group unit, if the shift amounts are different from the result of the chart shooting, repeat the rear lens group alignment until they become equal.

・Turn each power of the monitor, LINE GENERATOR, and MEGALIGHT 100 to OFF.
Remove the lens from the equipment (for periphery).

・Go back to [2. Chart shooting for the rear lens group alignment] (Page A44).
Repeat this procedure of [2. Chart shooting for the rear lens group alignment] (page A44) and [5. Rear lens group alignment] (Page A51).

【Create positioning tool of Rear lens-group holder for lens alignment】

1. Summery

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

The following devices are used:

- Rear cover ring (JAA80551 part no. 1K631-997A or 1K631-997B) ×1
- Bayonet mount unit (JAA80551 part no. 1C999-729) ×1
  For use, remove the other components than the bayonet mount section from the bayonet mount unit of RP.
- Screw (JAA80551 part no. G1-14035FD2)×3

3. Procedure

- Put the bayonet mount as below.

Put with the groove, in which the lock pin of camera body enters, facing upwards.

- Mount the rear cover ring on the bayonet mount, and fix them with three screws.

【How to create Setting board for "Lens alignment chart" and "Viewer"】

1. Summary

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

2. Preparation

Device

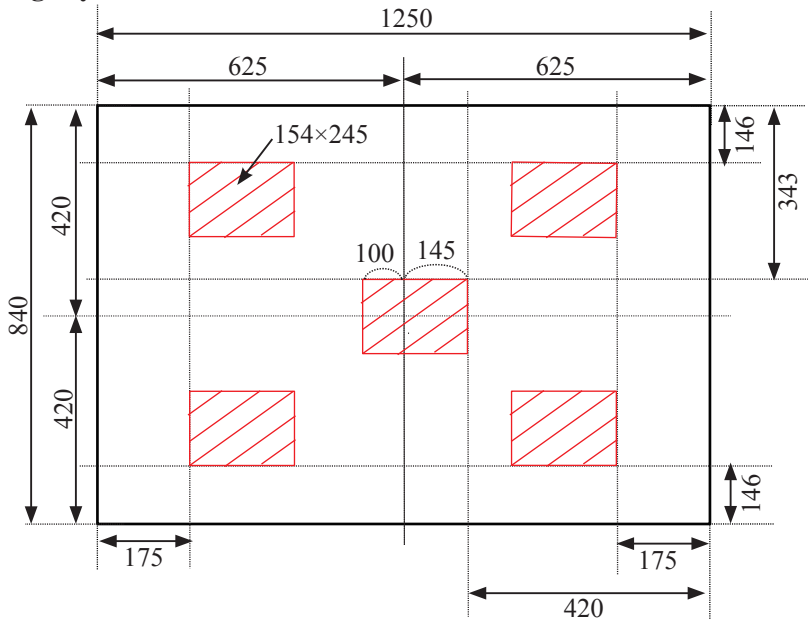
- Light viewer (for J19134): J19128A
  (Size: 154×245mm) 5 pcs.
- Lens alignment chart (for D3): J19128
  (Size: 840×1250mm) 1 pc.
- Board or cardboard box
  (Size: 840×1250×20mm) 1 pc.

(Note) Because it is necessary to cut out for fitting the light viewers, choose cardboard boxes or material which can be easily cut.

3. Procedure [In this document, 2 cardboard boxes (840×1250×10mm) are used.]

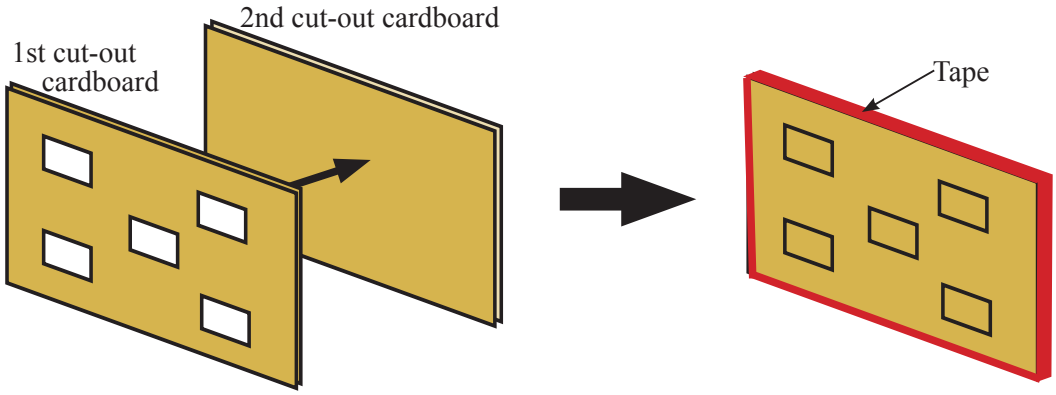
① As for the 1st flattened cardboard box, check the positions which the light viewers fit in, and cut out the shape at 5 locations (shaded parts/size 154 x 245 mm) as shown below.

(Note) Cutting the shape slightly smaller than the actual size of viewers makes it easier to fit the positions of viewers tightly.

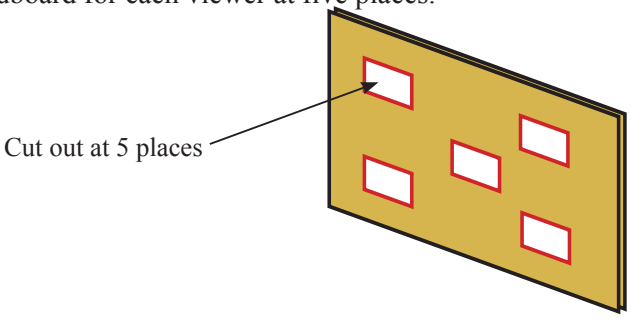


Dimensioned drawing

② Put the 1st cut-out cardboard (①) and the 2nd flattened cardboard together as one, and fix them by taping at four sides.

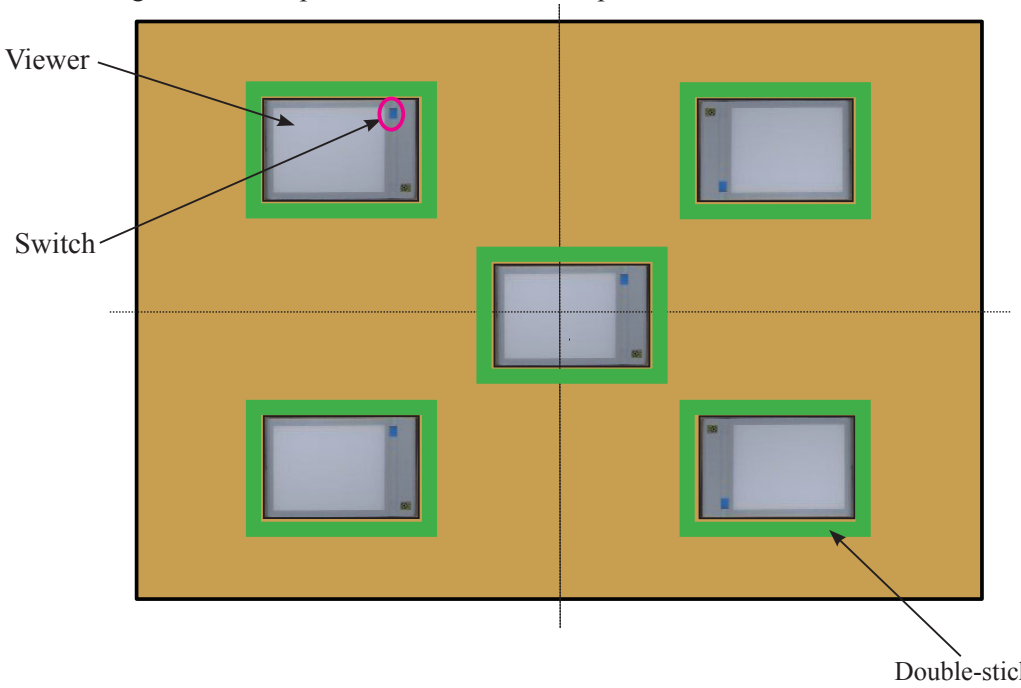


③ As for the above cardboards (②), cut out the same shape again as the cut-out size (ref. ①) from the 2nd flattened cardboard for each viewer at five places.



④ Fit the viewers in the created boards so that each viewer's switch is positioned as below.

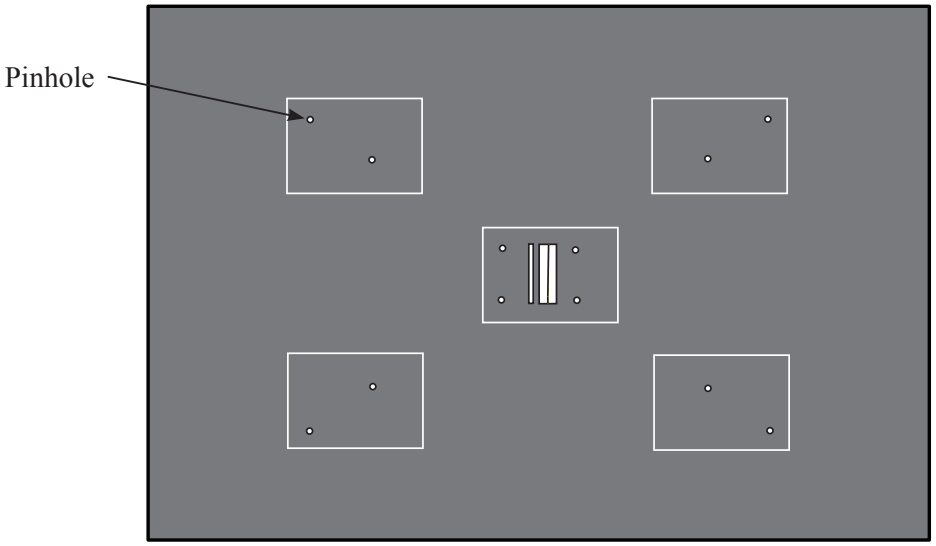
⑤ Reinforce the edges of cut-out parts with double-stick tape.



⑥ Light up the viewers. Set and attach the alignment chart (J19134) so that all the pinholes are located on the viewer.

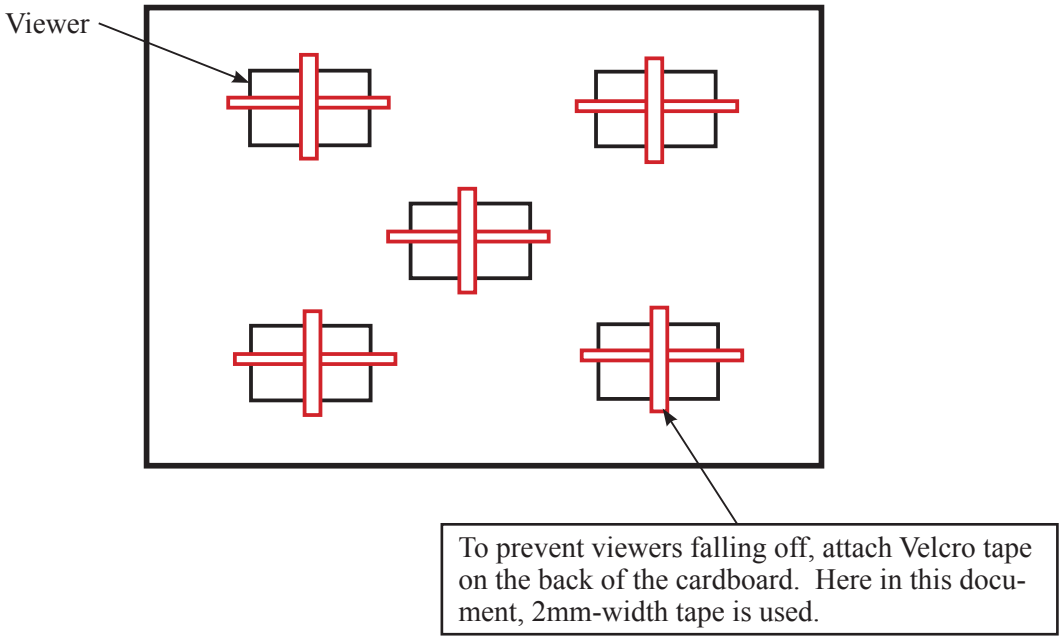
If the setting board is larger than the alignment chart, blacken the area around the setting board with black spray, etc, after attaching the chart.

Caution: To prevent the chart from being slackened around the pinholes, secure the chart by adhering the double-stick tape around the pinholes.



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

After viewers are put in position, secure them with Velcro tape (hook and loop fastener) on the back of the cardboard to prevent viewers falling off.



Adjustment for Electrical device

Preparation for Inspection & Adjustment

★ : New tool

In case of replacing the main PCB unit or SWM unit, etc, be sure to make the adjustments by using the adjustment software (★ J18454).

When the main PCB is replaced, be sure to perform "Writing of FLASH-ROM fixed elec. adj. values" (on page A79).

1. Required device

- Single output rated voltage power supply: 1 unit (6.0V 3.0A)
- Oscilloscope: 1 unit For inspecting lens driving time
- AF-I communication box (J15306-1): 1 unit
- AF-I communication adapter (J15307): 1 unit

2. AF-S DX 18-105 ED VR Inspection and adjustment program (★ J18454)

The below hardware requirements are necessary for installing the program on a computer.

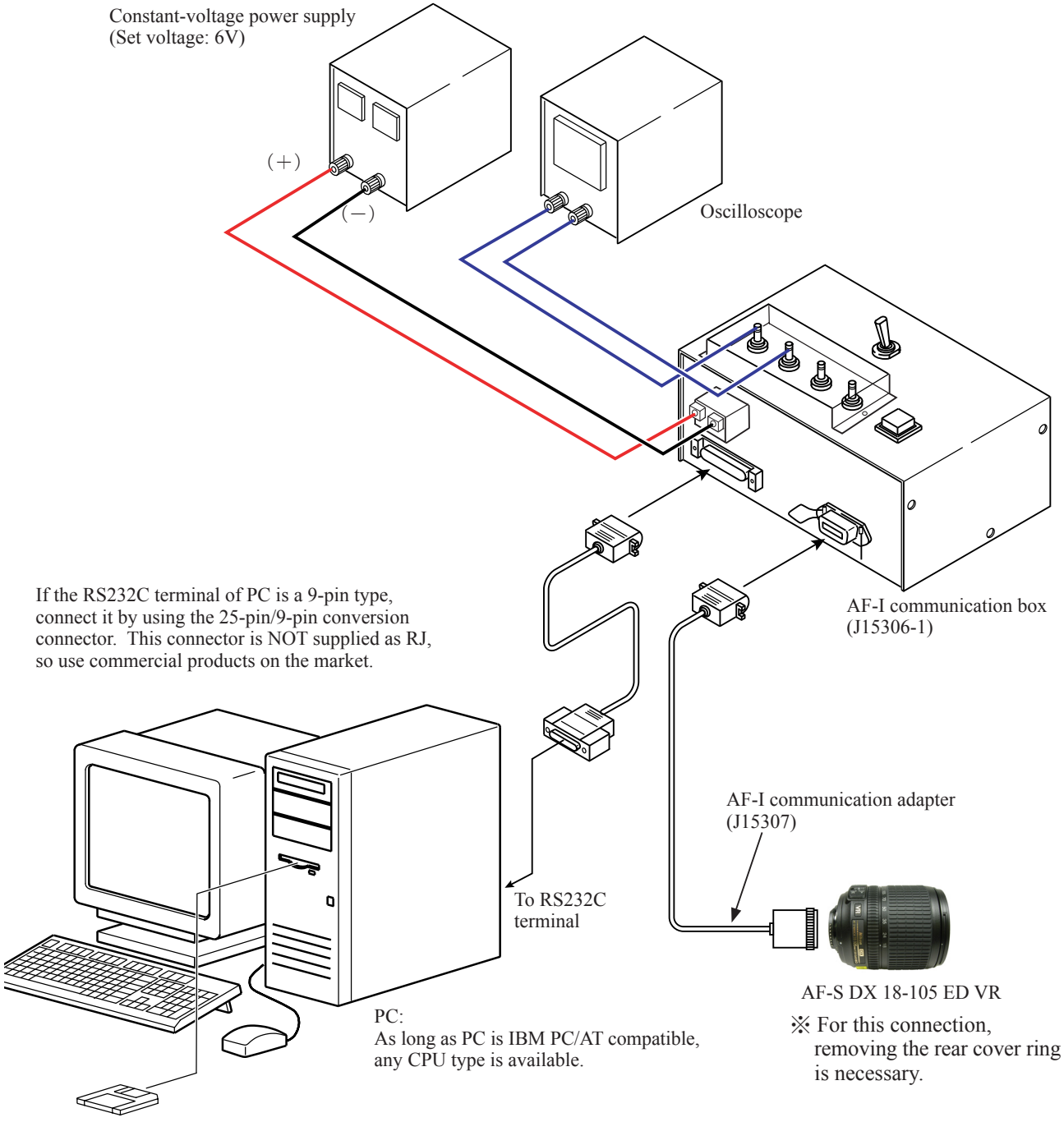
Ensure them before installation.

PC	IBM PC/AT compatible
OS	Windows Vista Home Basic, Windows Vista Home Premium, Windows Vista Business, Windows Vista Ultimate, Windows XP Home Edition, Windows XP Professional, Windows 2000
CPU	Pentium Ⅱ 266MHz or more
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.

【System configuration】

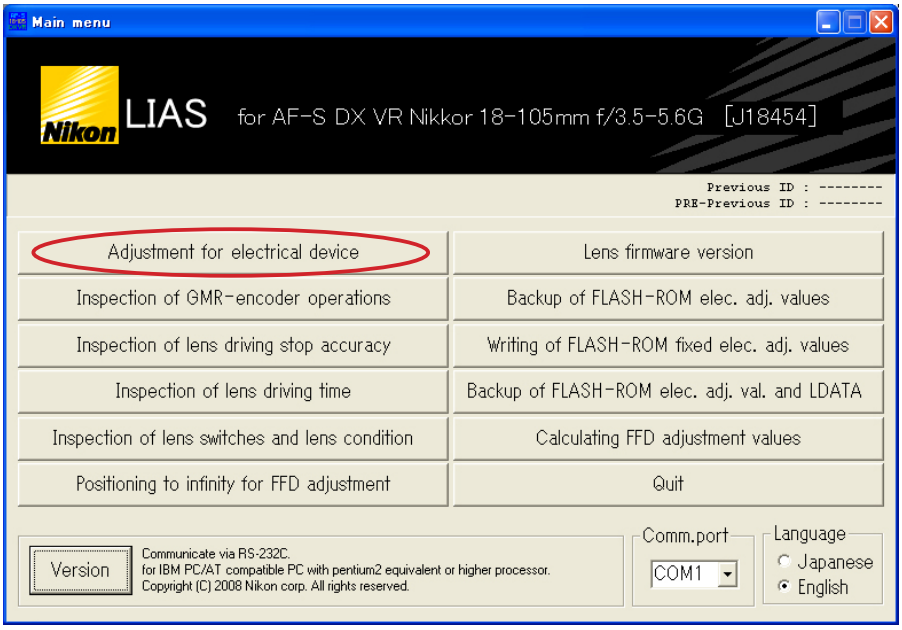
★ : New Tool



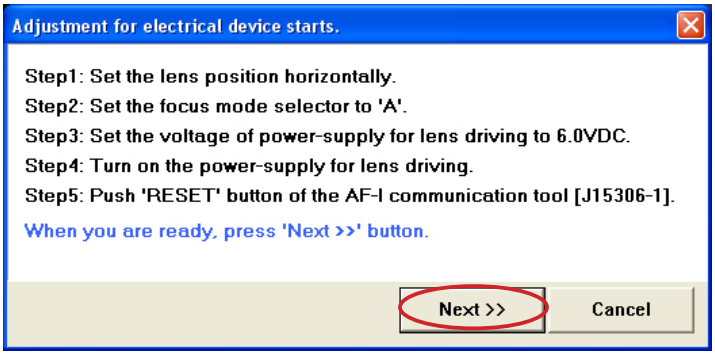
Adjustment for electrical device

When the main PCB unit or SWM unit is replaced, be sure to make this adjustment.

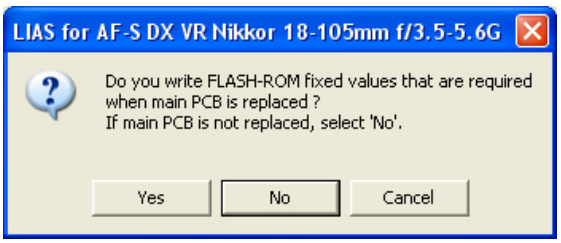
・Click "Adjustment for electrical device" on the main menu.



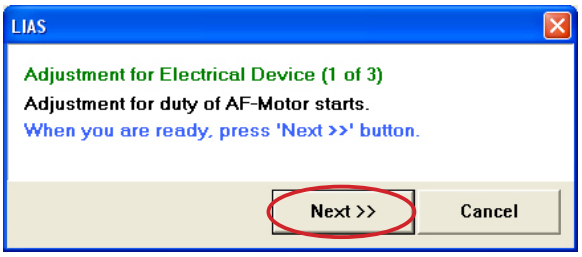
・Follow the instructions on the screen. When prepared, click "Next".



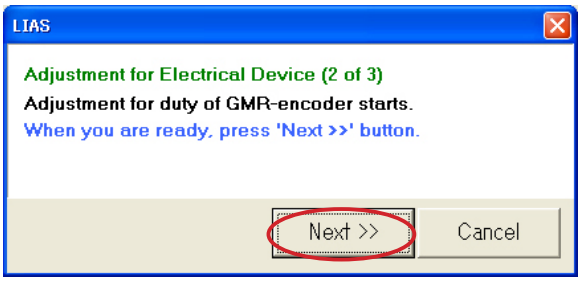
・Click "Yes" if the main PCB is replaced, while click "No" if it is NOT replaced.
Clicking "Yes" goes on to "Writing of FLASH-ROM fixed elec. adj. values".



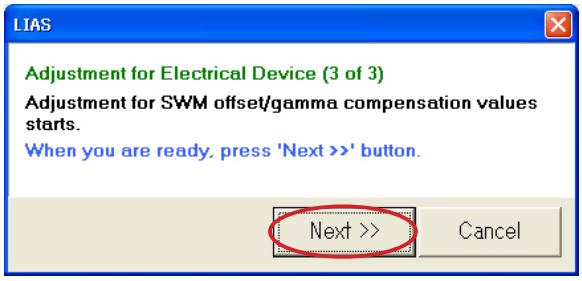
・Click "Next".



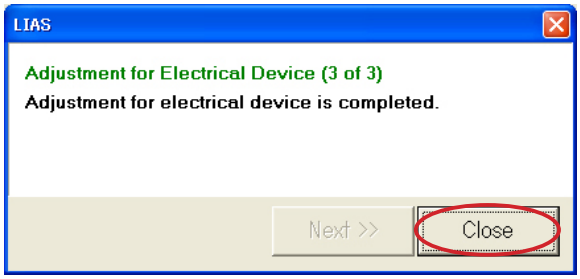
・Click "Next".



・Click "Next".



・When the adjustment is completed, click "Close" to end the procedure.



Inspection of lens operations

After the assembly, be sure to make inspections of lens operations.

Inspection items of lens operation

1. Inspection of GMR-encoder Operations

Activate the scanning drive of lens and check all the pulse numbers.

If GMR encoder is defective, the pulse number will be out of standard.

2. Inspection of Lens Driving Stop Accuracy

Check the overrun/underrun pulse number, compared with each lens drive amount, (i.e. deviation amount of the stop position from the target position) upon lens driving.

3. Inspection of Lens Driving Time

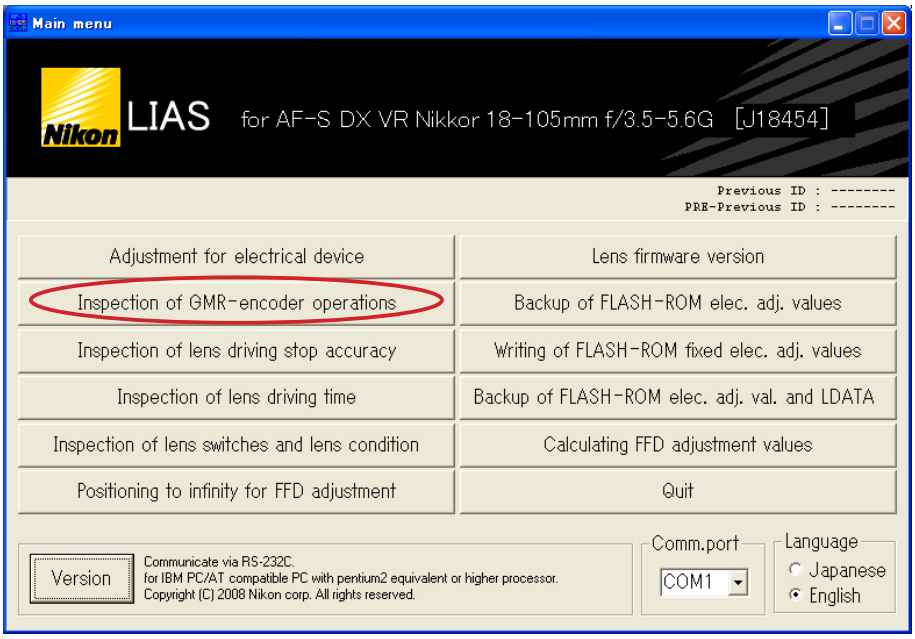
Using an oscilloscope, check the each driving time (from starting to ending of servo-motor driving) upon lens driving.

4. Inspection of Lens switches and Lens condition

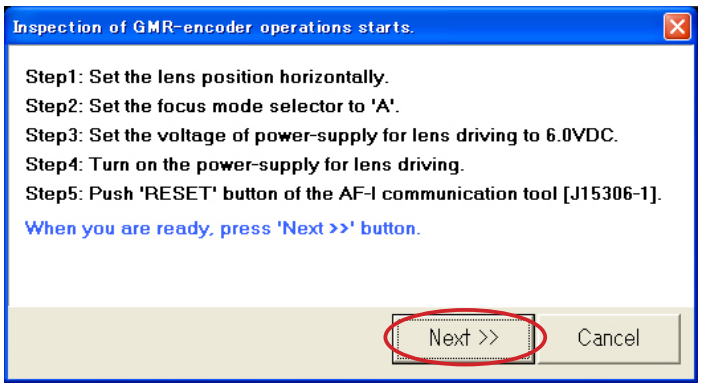
Check ON/OFF operations of each switch, and the operating condition of focus encoder.

Inspection of GMR-encoder operations

・Click "Inspection of GMR-encoder operations" on the main menu.

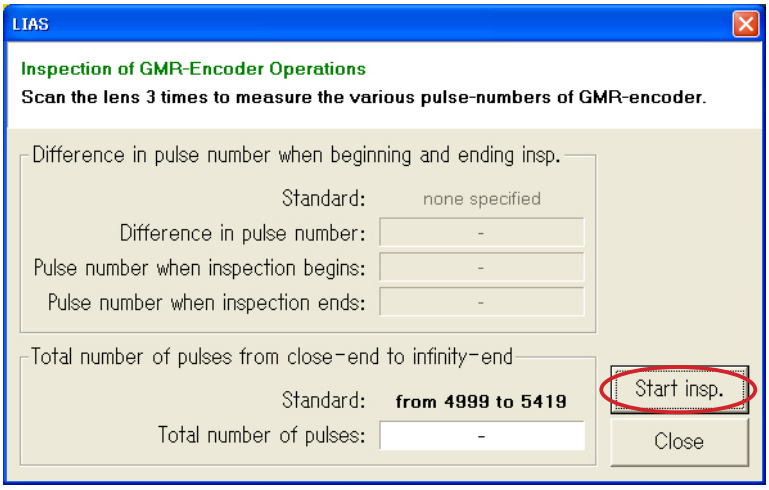


・Follow the instructions on the screen. When prepared, click "Next".

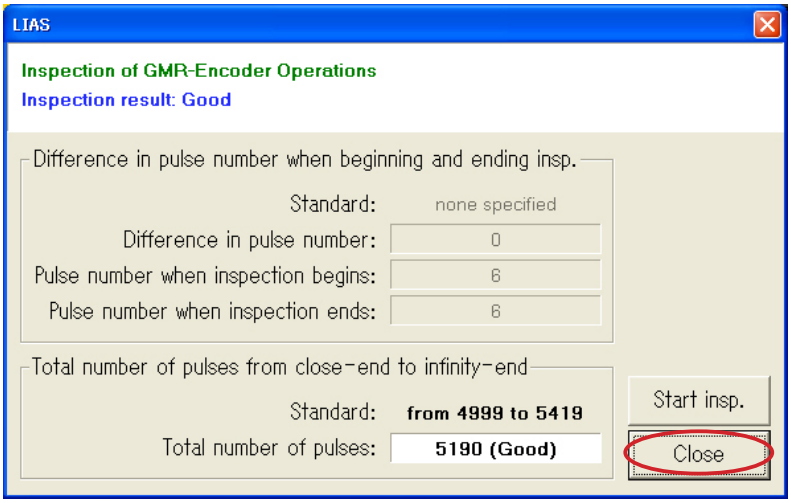


・Click "Start insp.".

Caution : If the zoom ring is rotated while the lens scanning is driven, the pulse shows an abnormal value. Do NOT touch the zoom ring during operations.



・If "Inspection result" shows "Good", click "Close".



< Standard > Total pulses : 4999 ～ 5419 PULSE(S)

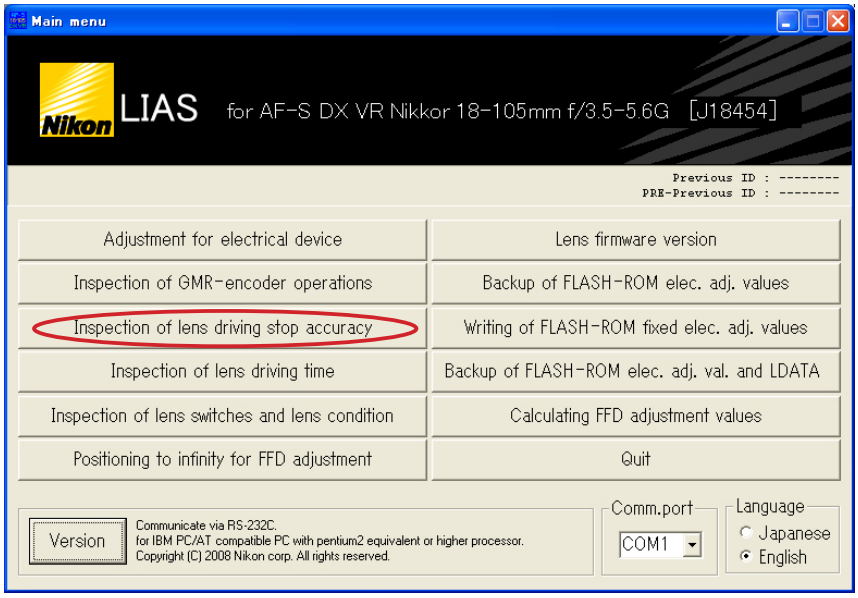
Inspection of lens driving stop accuracy

Make the inspections by focal length 18mm (Wide-end) or 105m (Tele-end) at the following five lens positions.

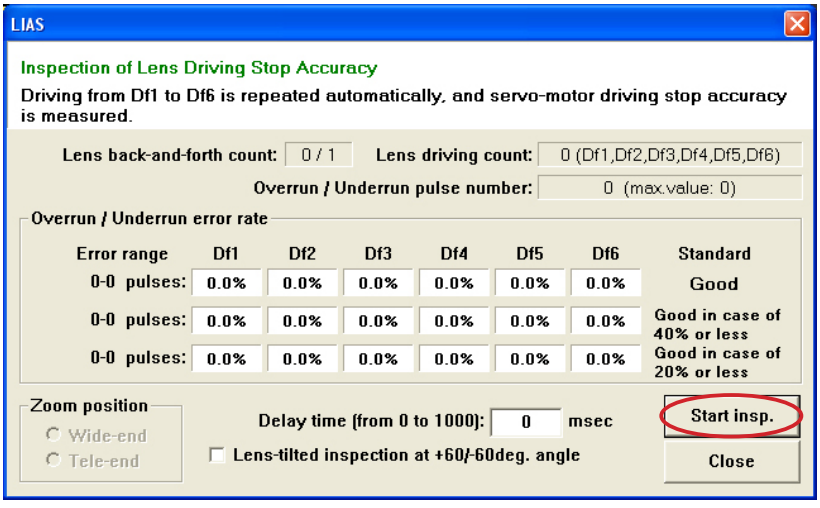
< Lens position in inspecting >

Lens position	Index position
Horizontal lens position	Index facing (1) up / (2) right / (3) left
(4) Front lens group 60° angle upward	
(5) Front lens group 60° angle downward	

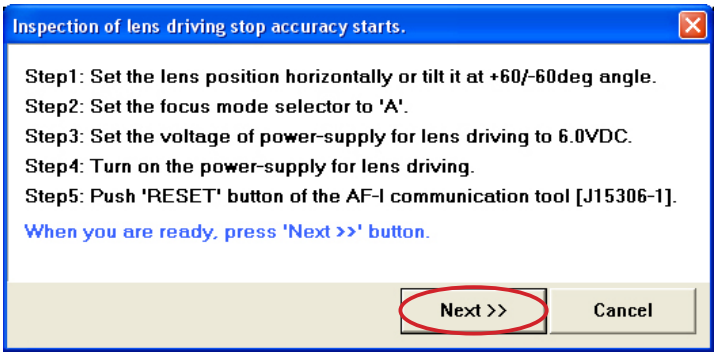
・Click "Inspection of lens driving stop accuracy" on the main menu.



・Click "Start insp.".

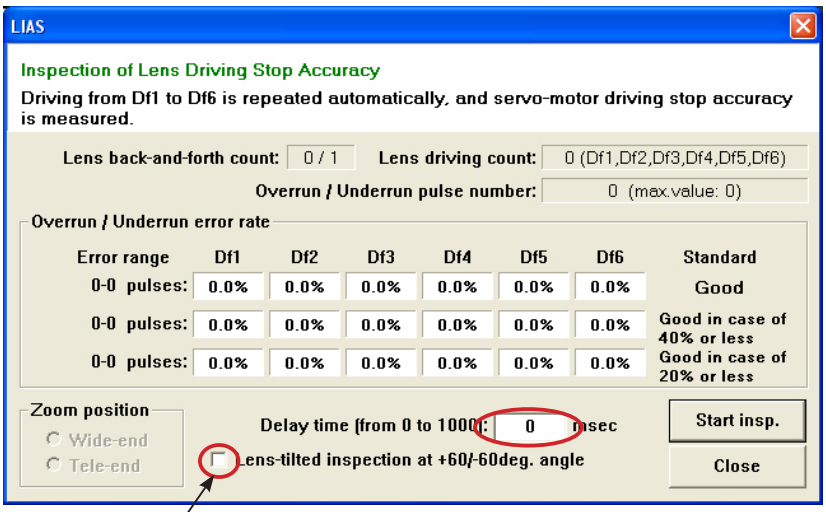


・Follow the instructions on the screen. When prepared, click "Next".



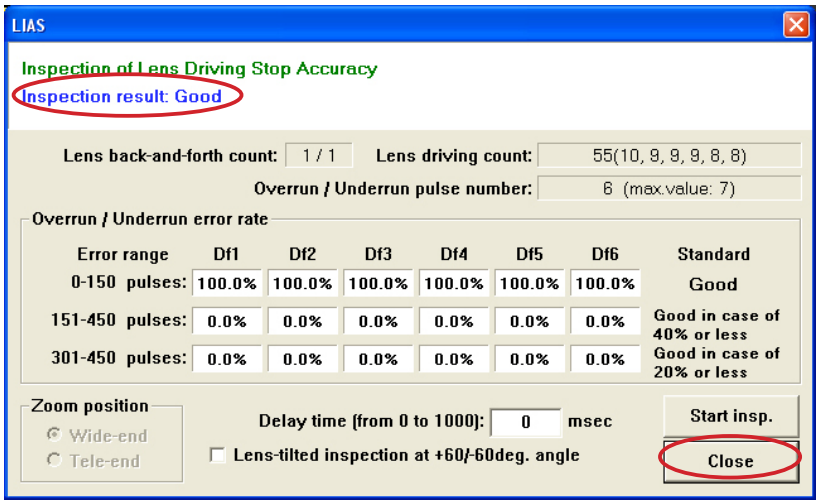
・If the lens stops, input a numeric number into "Delay time (from 0 to 1000 msec.) so that the lens does NOT stop.

Caution : The value of "Delay time" is set by the adjustment software. So, as far as the lens does not stop during the inspection of "Lens Driving Stop Accuracy", any value can be input without problem.
However, the larger the value of "Delay time" gets, the longer the inspection time becomes.



Tick here when measuring with the front lens group facing 60° angle up/downward.

・If "Inspection result" shows "Good", click "Close" to end the procedure.



< Standards of The number of overrun/underrun pulses after the lens back-and-forth driving 1-motion >

Lens position	Error range of Df1 - Df6 (No. of occurrence)	Error pulse occurrence ratio: Judgment
Horizontal	0 - 150	GOOD
Horizontal	150 - 450	GOOD if 40% or less
Horizontal	301 - 450	GOOD if 20% or less
±60°	0 - 150	GOOD
±60°	150 - 450	GOOD if 40% or less
±60°	301 - 450	GOOD if 20% or less

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

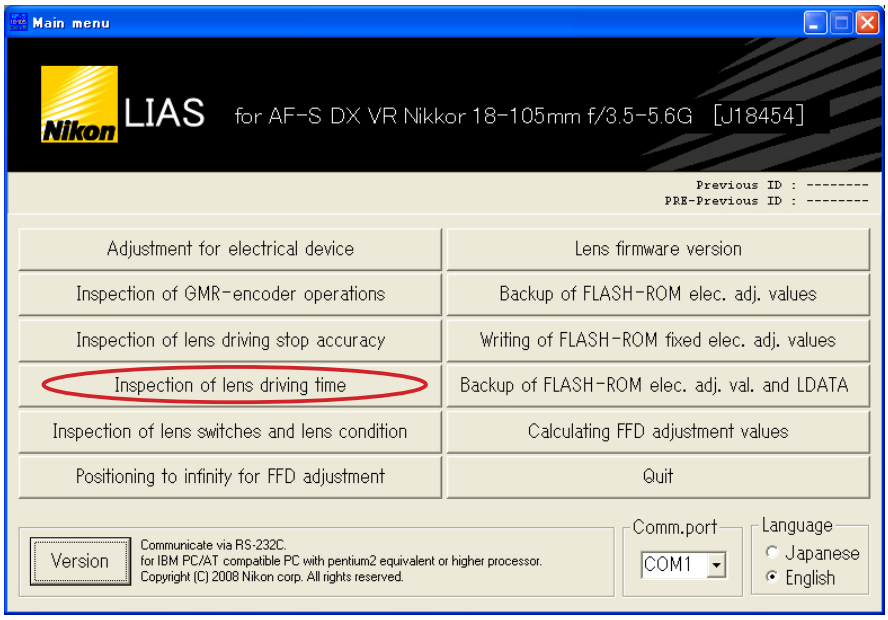
Inspection of lens driving time

Make inspections by focal length 18mm (Wide-end) or 105m (Tele-end) at the following five lens positions.

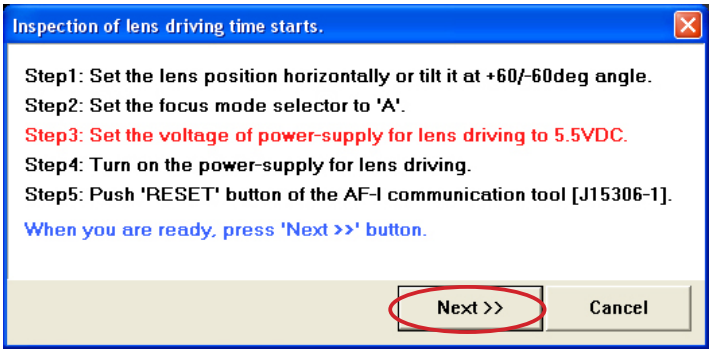
< Lens position in inspecting >

Lens position	Index position
Horizontal lens position	Index facing (1) up / (2) right / (3) left
(4) Front lens group 60° angle upward	
(5) Front lens group 60° angle downward	

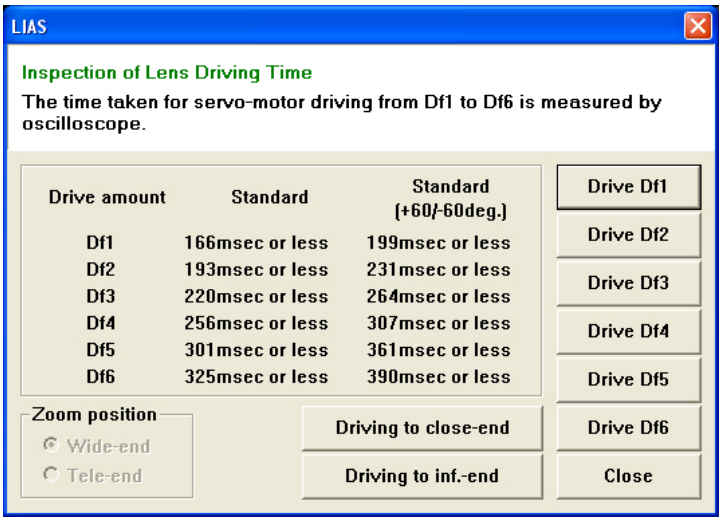
・Click "Inspection of lens driving time" on the main menu.

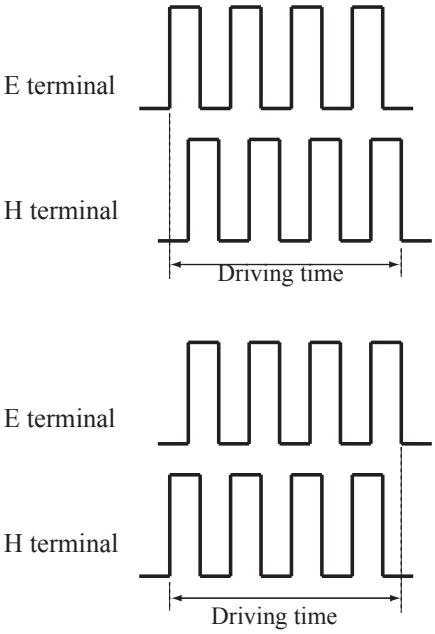


・Follow the instructions on the screen. When prepared, click "Next".



・ Select the driving amount respectively. Each lens driving time must be within the standard.



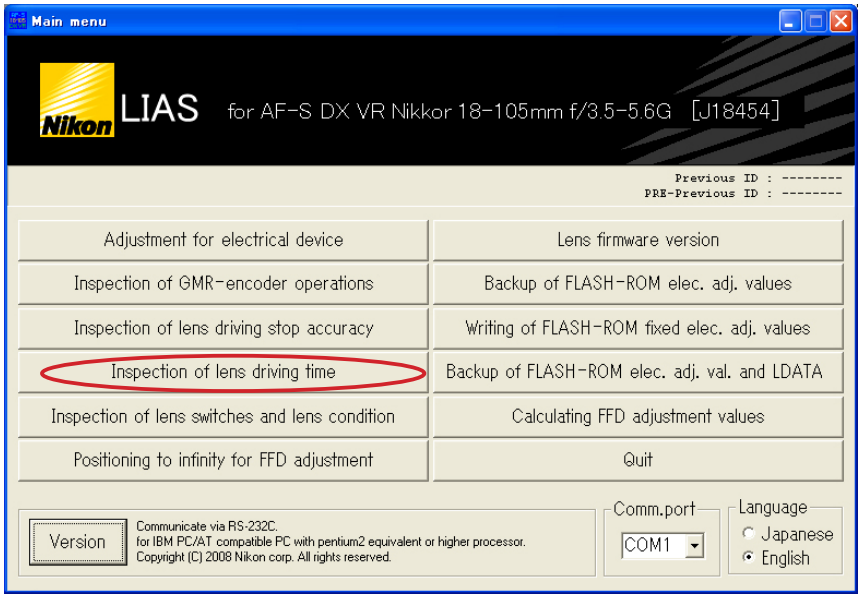


Oscilloscope setting	
V/Div	5V
Coupling	DC
Time/Div	20msec
Trigger Mode	SGL(S)
Trigger Coupling	DC
Trigger Source	CH1

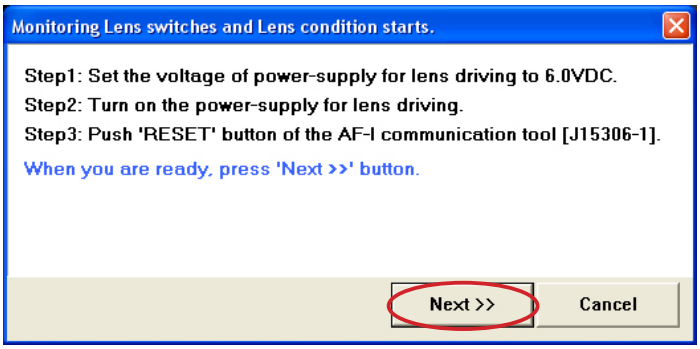
※ There are two types in shape of waveforms of E and H terminals:
Waveform starts and goes up starts and goes down.

Inspection of Lens switches and Lens conditions

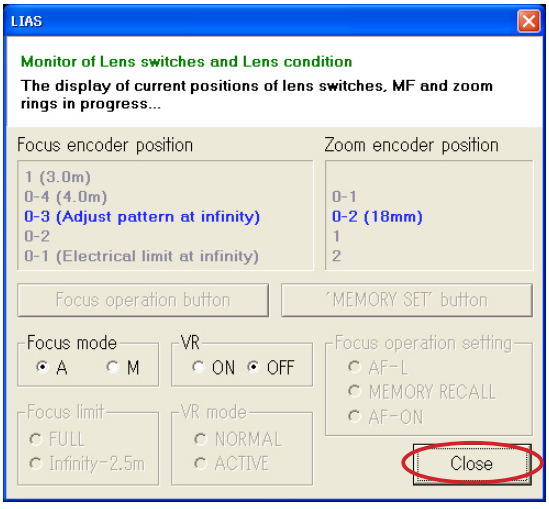
・Click "Inspection of lens switches and lens condition" on the main menu.



・Follow the instructions on the screen. When prepared, click "Next".

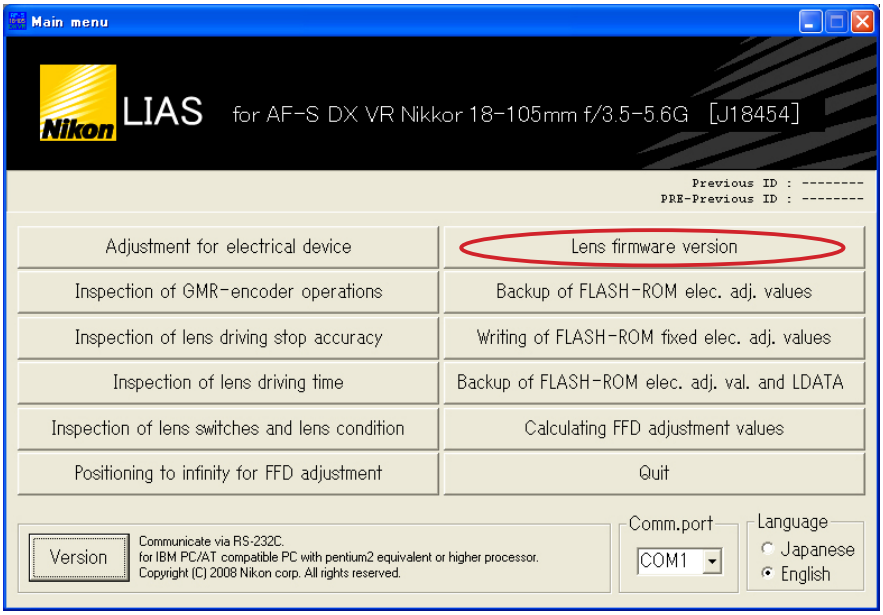


・If there is no problem with each check item, click "Close" to end the procedure.

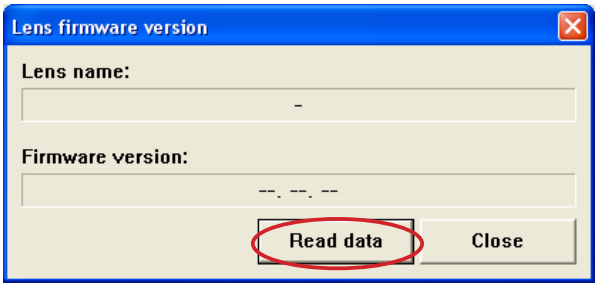


Lens firmware version

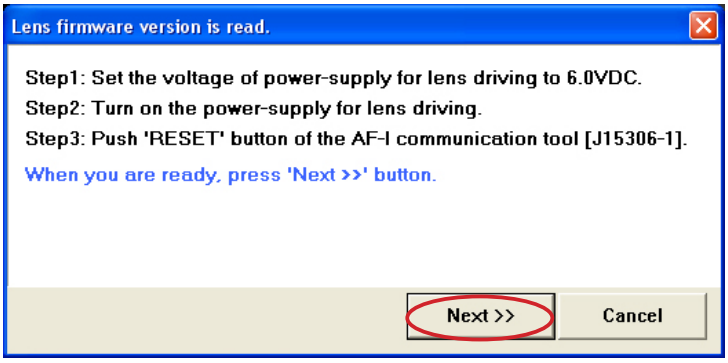
・Click "Lens firmware version" on the main menu.



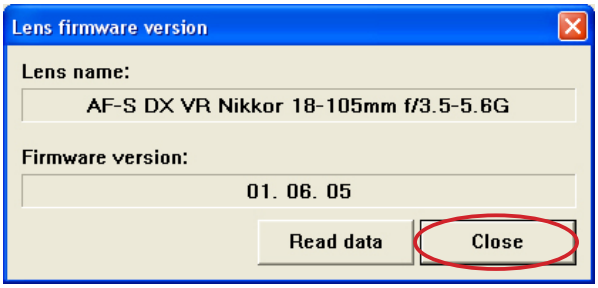
・Click "Read data".



・Follow the instructions on the screen. When prepared, click "Next".



・Confirm that there is no mistake in the lens name and firmware version. Then click "Close" to end the procedure.

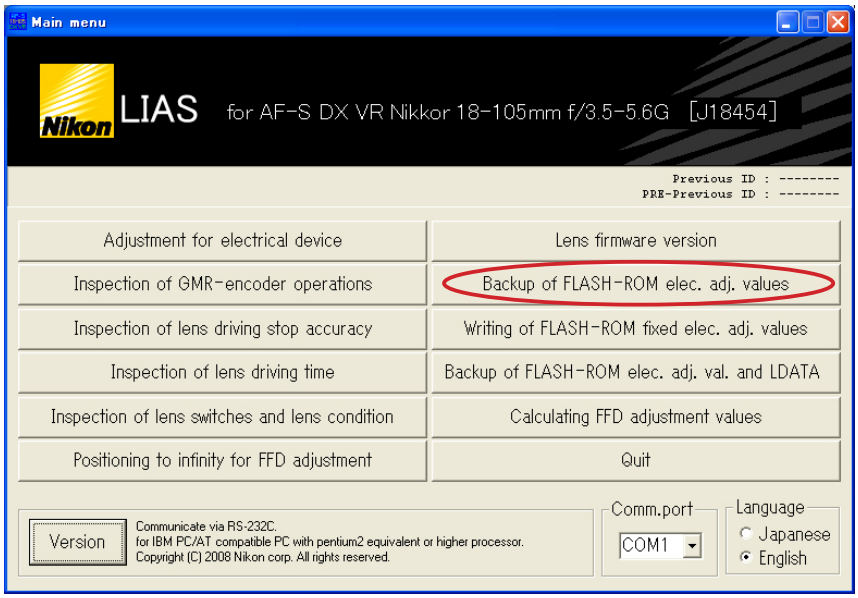


Backup of FLASH-ROM electrical adjustment values

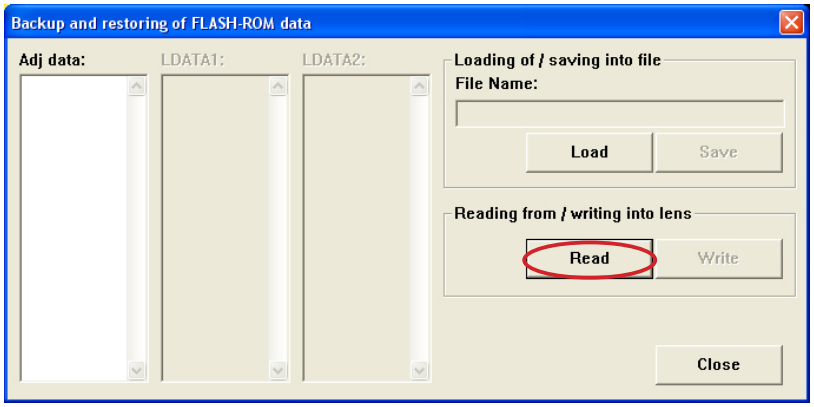
This describes about how to backup and restore the electrical adjustment value.

How to back up:

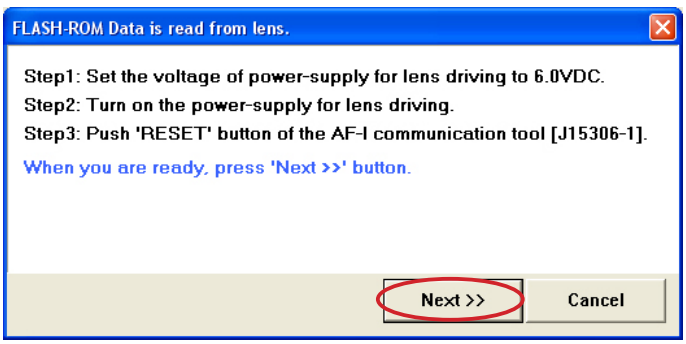
・Click "Backup of FLASH-ROM elec. adj. values" on the main menu.



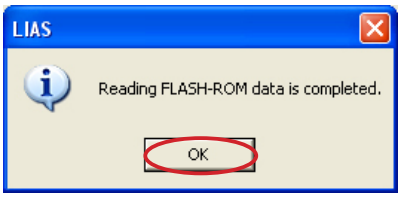
・Click "Read" of "Reading from/Writing into lens".



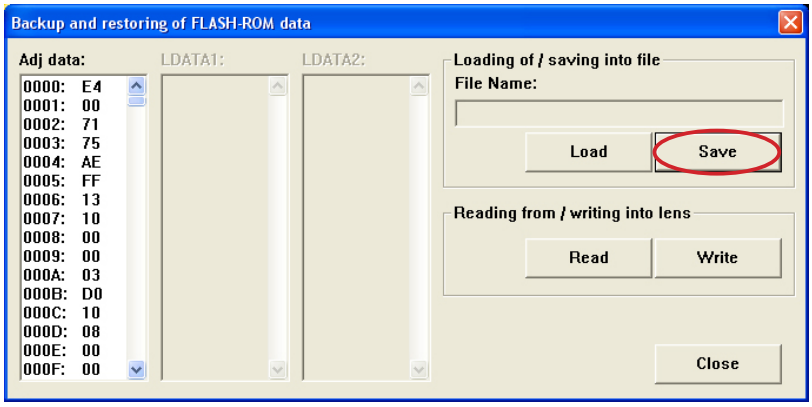
・Follow the instructions on the screen. When prepared, click "Next".



・When reading FLASH-ROM data is completed, click "OK".

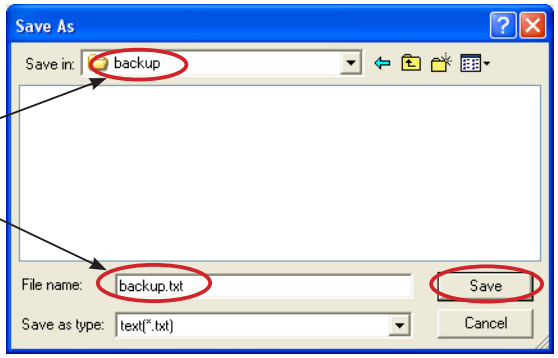


・Click "Save" of "Loading of/Saving into file".

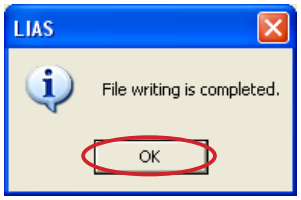


・Type the file name in any folder, and click "Save".

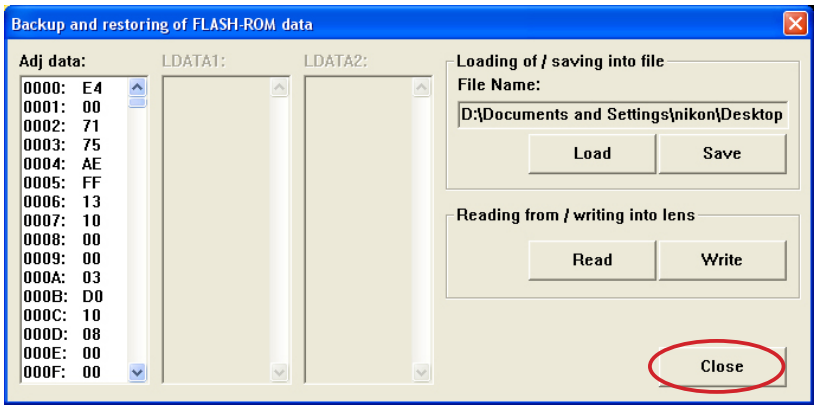
e.g.



・When writing the file is completed, click "OK".

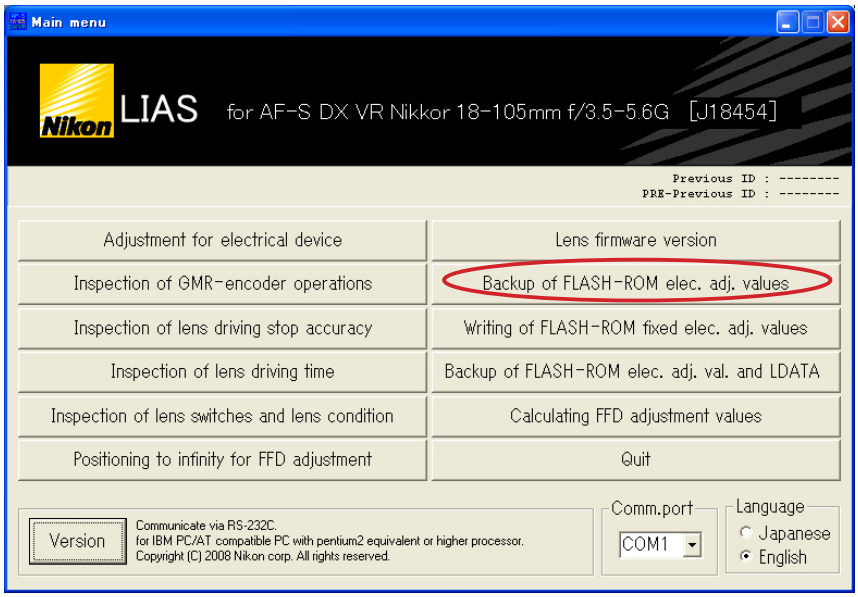


・ Click "Close" to end the procedure.

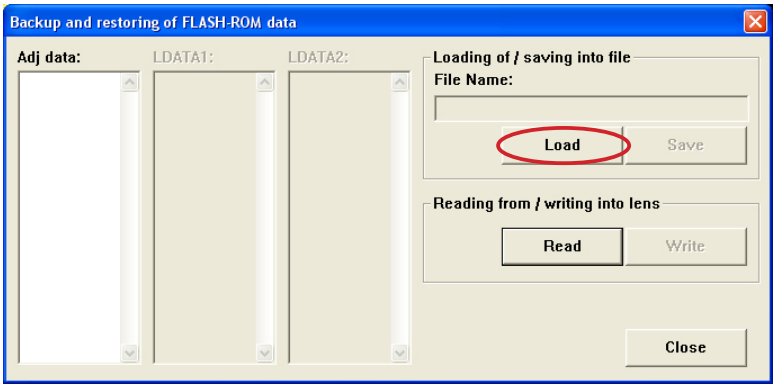


How to restore:

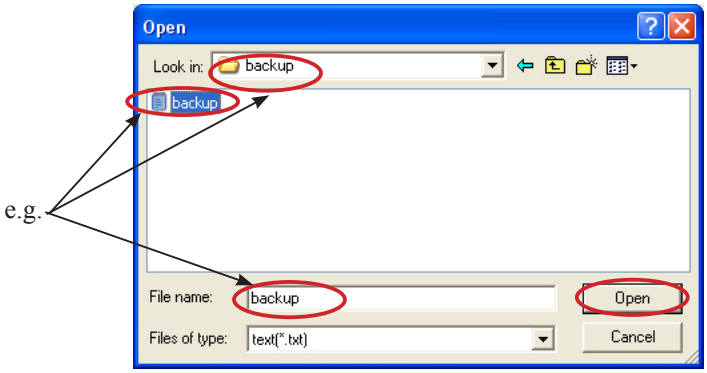
・Click "Backup of FLASH-ROM elec. adj. values" on the main menu.



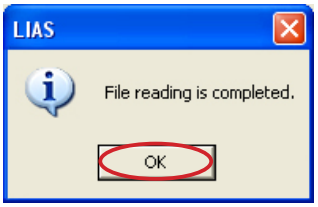
・Click "Load" of "Loading of/Saving into file".



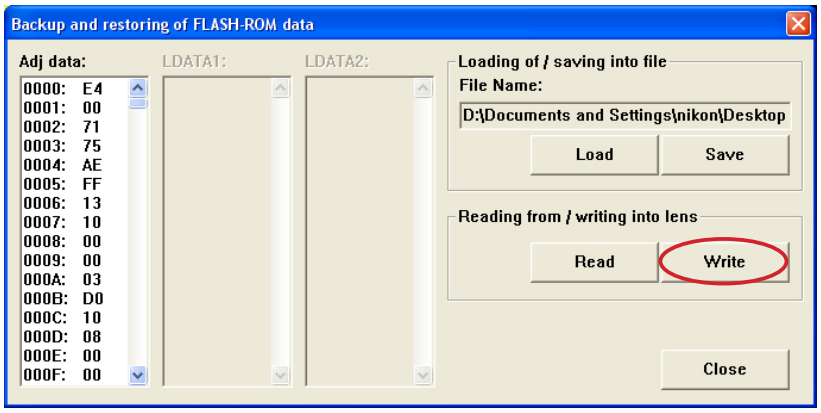
・Select the file name in the folder that was saved as backup, and click "Open" button.



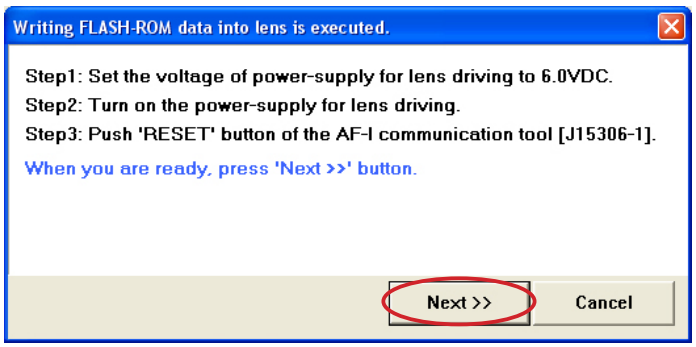
・When reading the file is completed, click "OK" button.



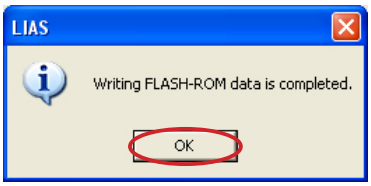
・Click "Write" of "Reading from/writing into lens".



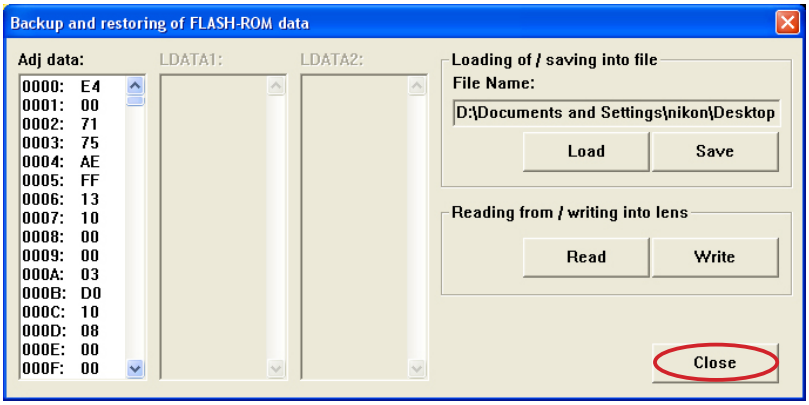
・Follow the instructions on the screen. When prepared, click "Next".



・When writing FLASH-ROM data is completed, click "OK".

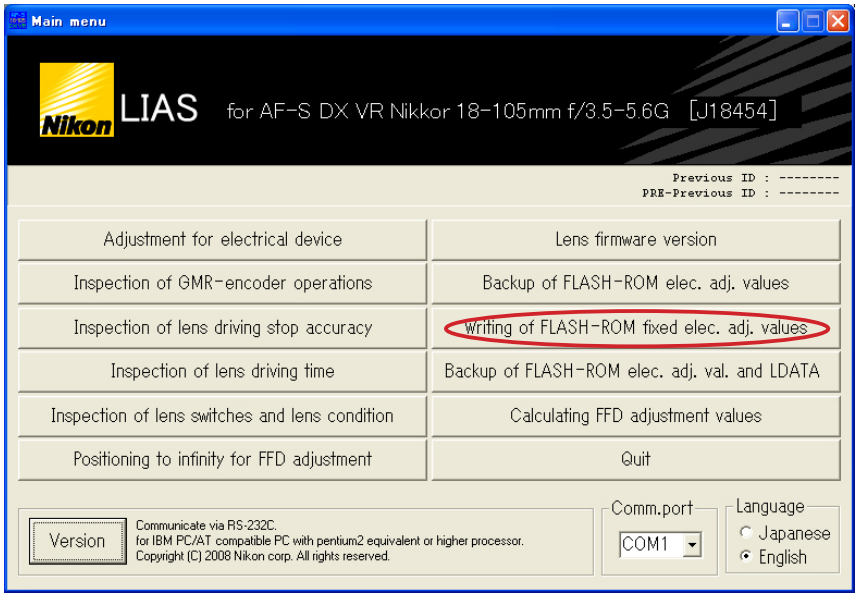


・Click "Close" to end the procedure.

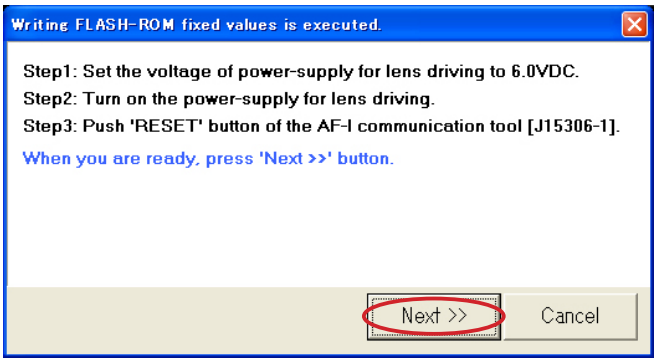


Writing of FLASH-ROM fixed electrical adjustment values

・Click "Writing of FLASH-ROM fixed elec. adj. values" on the main menu.



・Follow the instructions on the screen. When prepared, click "Next".



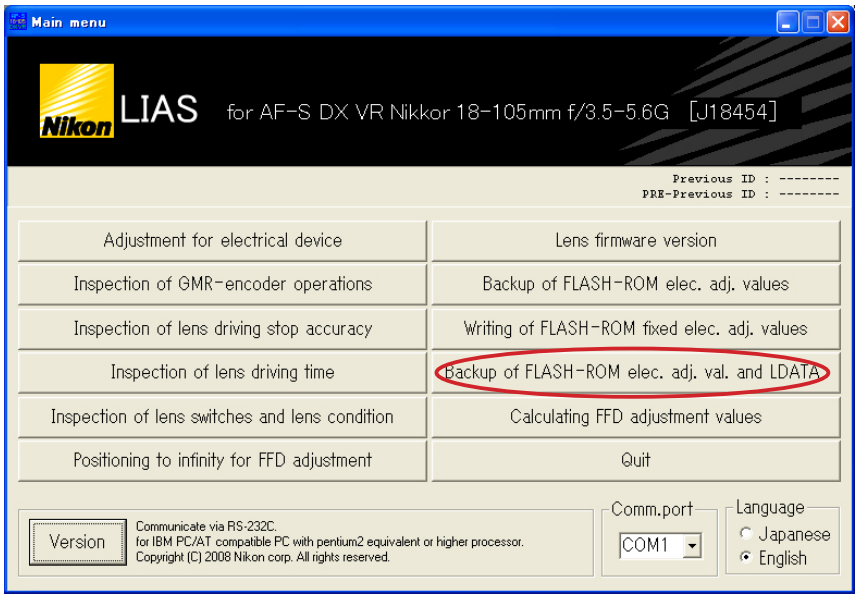
・When writing FLASH-ROM fixed electrical adjustment values is completed, click "OK".

Backup of FLASH-ROM electrical adjustment value and LDATA

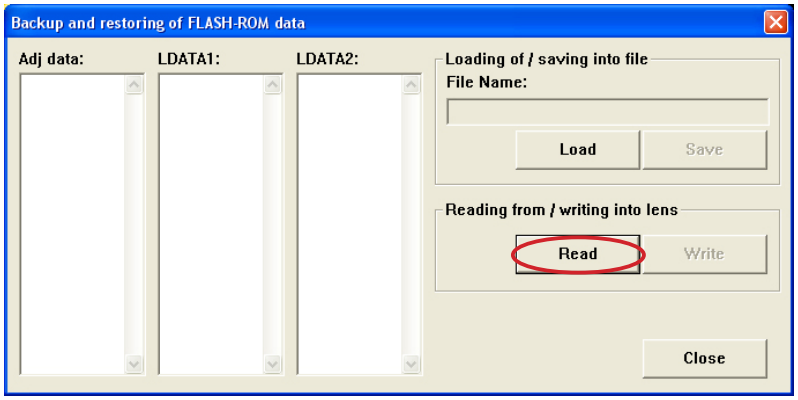
This describes about how to backup and restore the electrical adjustment value and the aberration compensation data (LDATA).

How to back up:

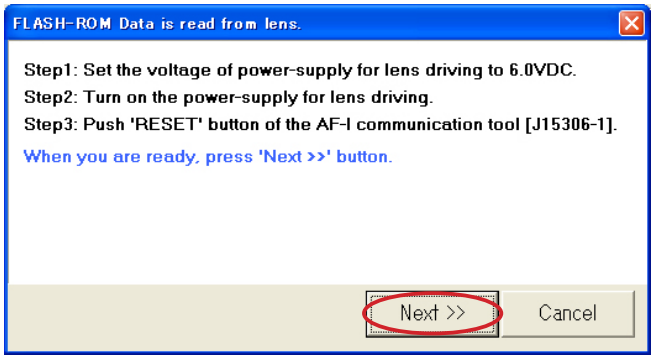
・Click "Backup of FLASH-ROM elec. adj. val. and LDATA" on the main menu.



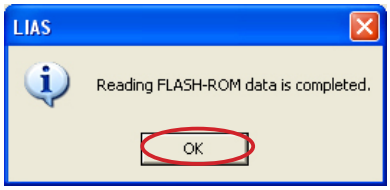
・Click "Read" of "Reading from/Writing into lens".



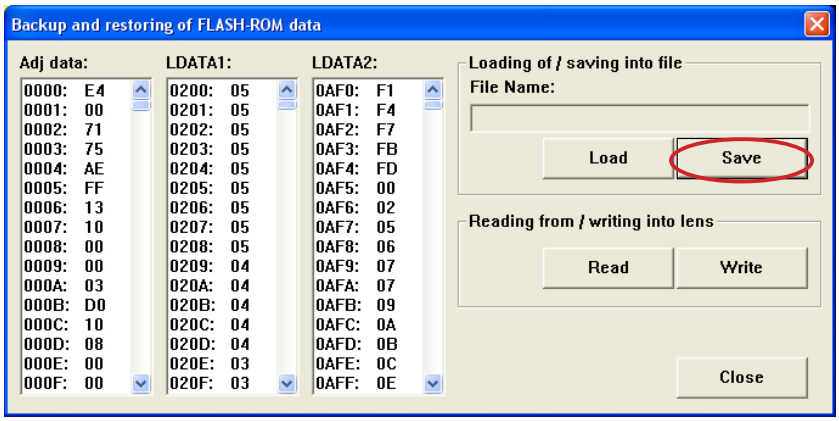
・Follow the instructions on the screen. When prepared, click "Next".



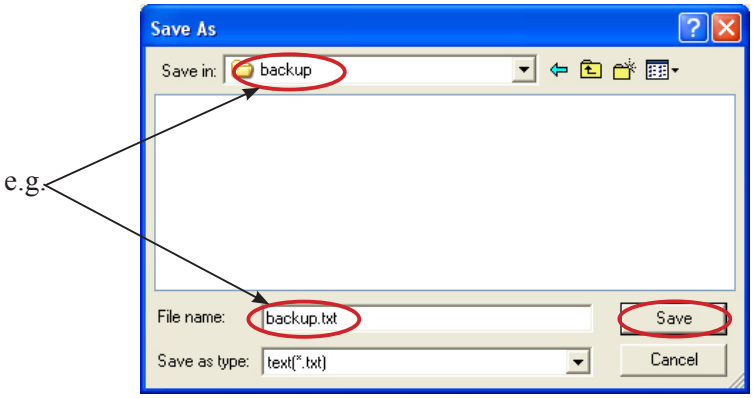
・When reading FLASH-ROM data is completed, click "OK".



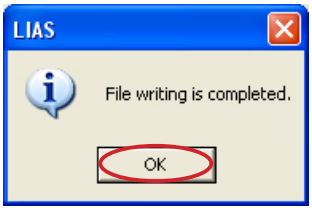
・Click "Save" of "Loading of/Saving into file".



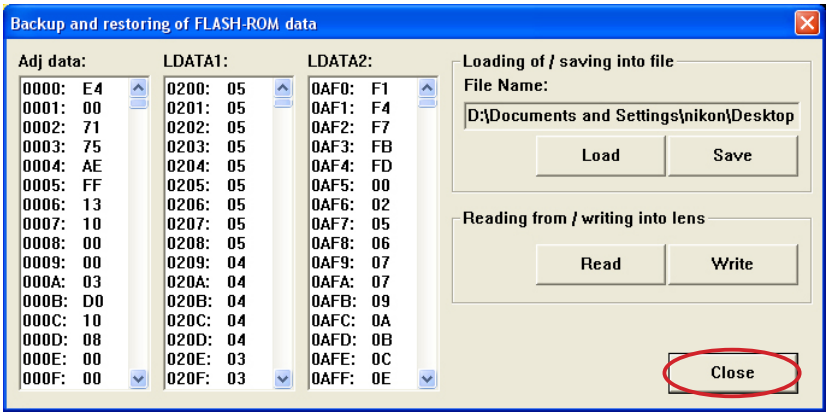
・Type the file name in any folder, and click "Save".



・When writing the file is completed, click "OK".

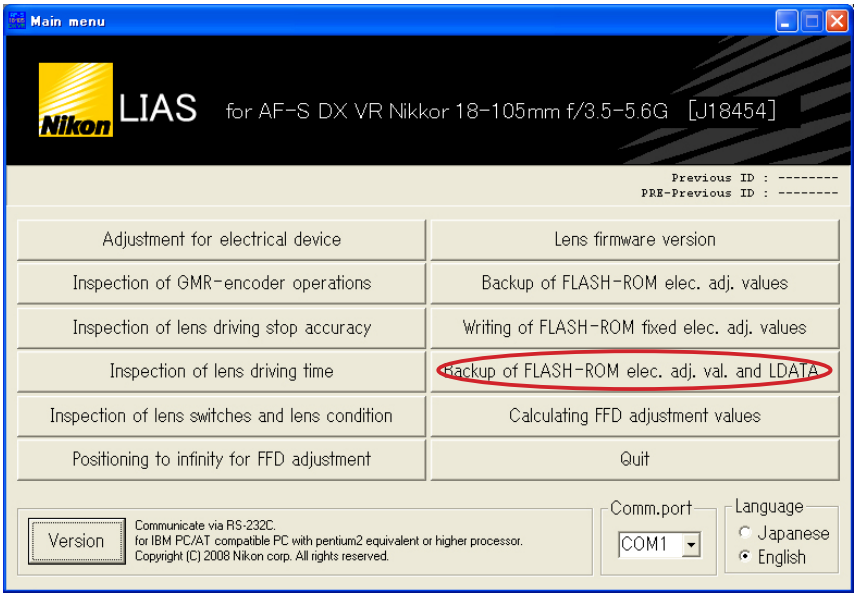


・Click "Close" to end the procedure.

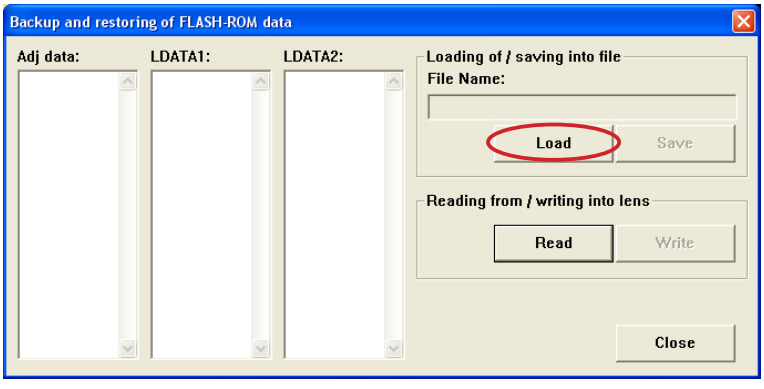


How to restore:

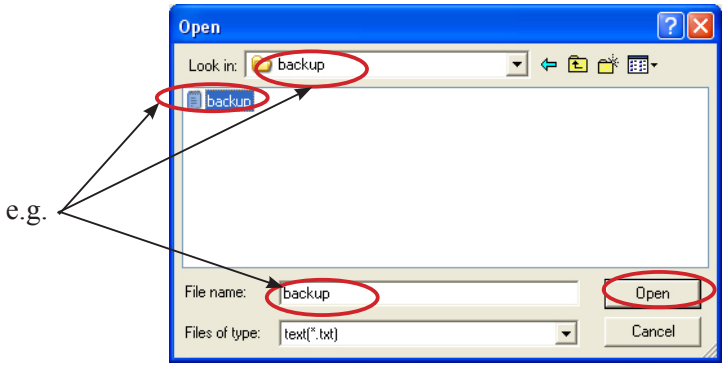
・Click "Backup of FLASH-ROM elec. adj. val. and LDATA" on the main menu.



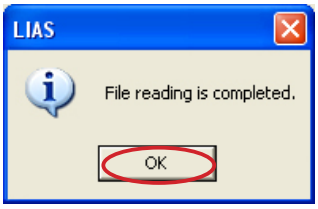
・Click "Load" of "Loading of/Saving into file".



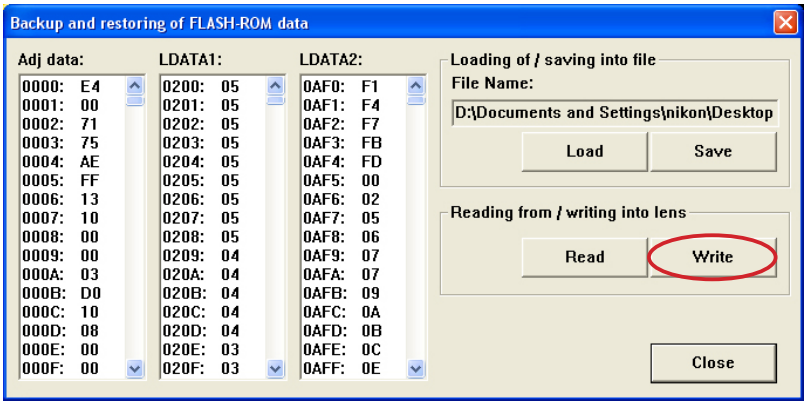
・Select the file name in the folder that was saved as backup, and click "Open".



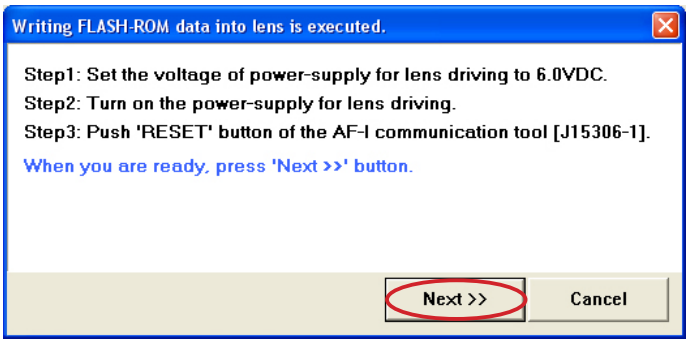
・When reading FLASH-ROM data is completed, click "OK".



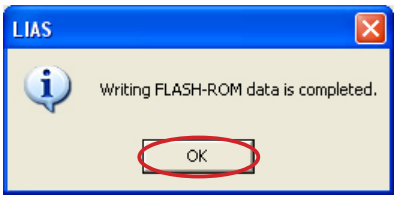
・Click "Write" of "Reading from/Writing into lens"



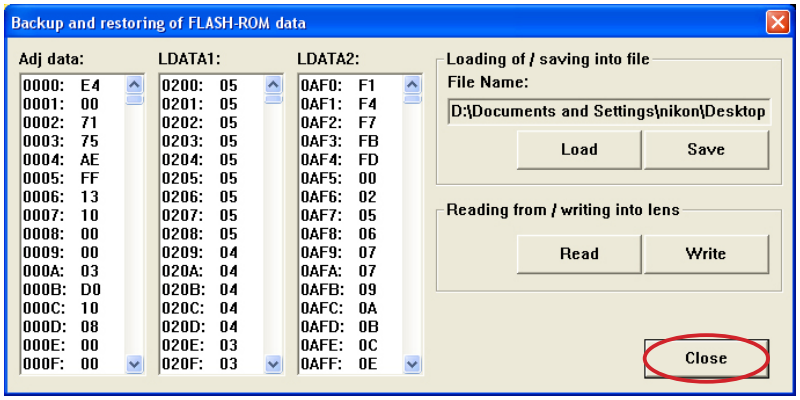
・Follow the instructions on the screen. When prepared, click "Next".



・When writing FLASH-ROM data is completed, click "OK".



・Click "Close" to end the procedure.

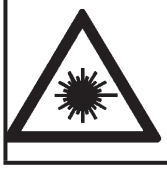


Reference: Necessary adjustment when replacing parts

Parts to be replaced \ Adjustments	Adjustment for electrical device	Lens alignment (incl. inspection of aberration compensation)	VR adjustment
Main PCB unit	○	Adjustment of aberration compensation	○
SWM unit	○		
3-4 lens group unit (incl. VR unit)		○	○
Fixed ring unit (incl. Gyro FPC)			○
5th lens group unit		○	

3.VR Adijustment

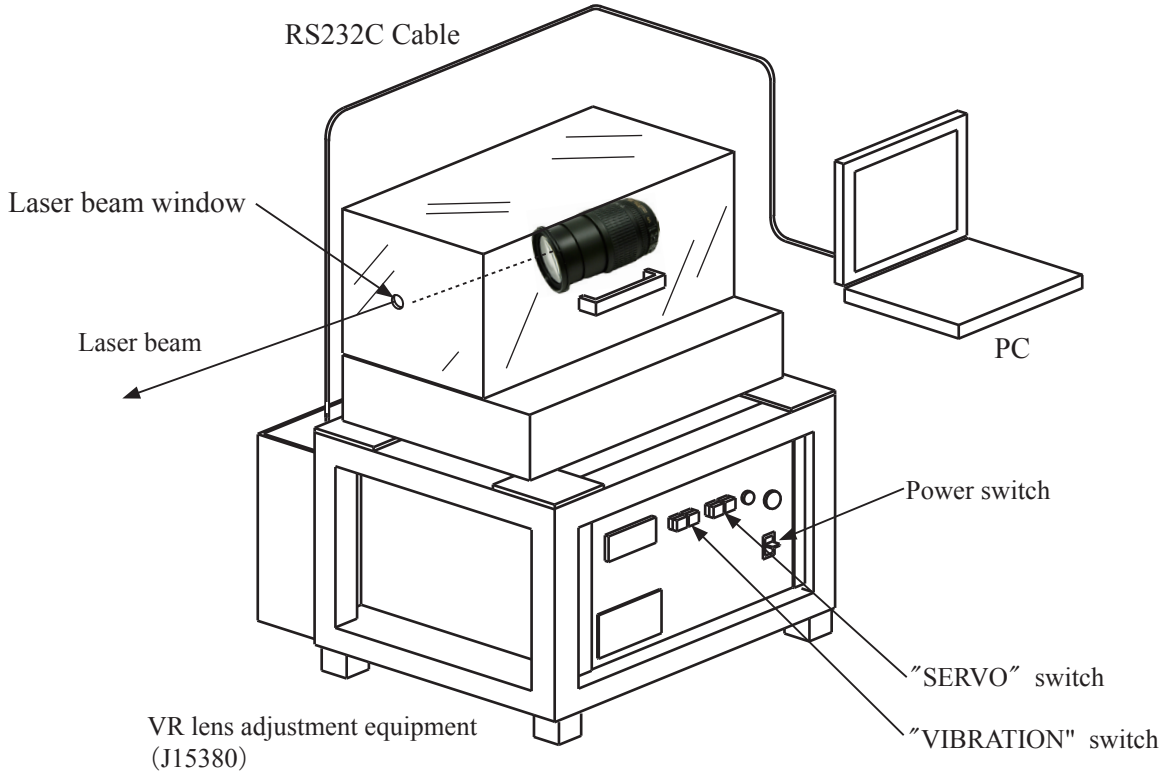
When making the VR adjustment, refer to the "Instruction Manual" that is attached to the VR lens adjustment equipment (J15380).

⚠ WARNING
 •This equipment uses the laser beam. Do not look at the laser beam directly or through the laser beam window.

1. Setup of VR lens adjustment equipment (J15380)

1. Set up the VR lens adjustment equipment (J15380) as shown below.

Caution: Keep the approx. 5-m distance from the laser beam window to the radiated surface.
Do not block the light path of the laser beam.



2. Connect the PC to the equipment (J15380) and start the PC.

3. Mount the lens on the equipment (J15380). Refer to "3. Procedure for fixing Lens" on Page A88 for details.

2. Startup of VR adjustment software

★ :New Tool

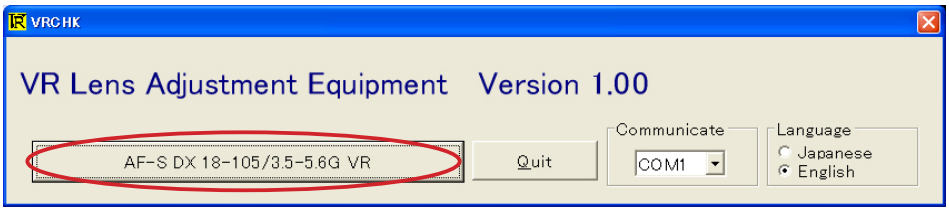
1. Turn the VR lens adjustment equipment (J15380) ON.

2. Mount the lens on the equipment (J15380).

3. Set VR mode switch to "ON", A/M mode switch to "M/A".

4. Start the VR adjustment software (★ J18457).

5. Click "AF-S DX 18-105/3.5-5.6G VR".



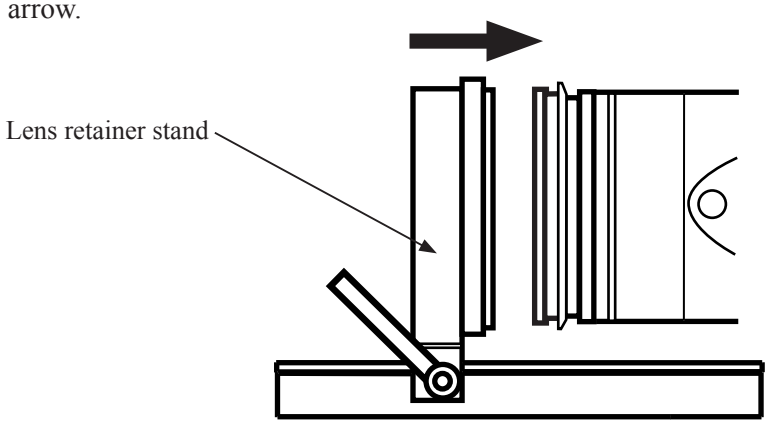
6. If the following messages appear, follow the instructions on the screen and click "OK".

Caution: Do not change the lens settings until the adjustment is completed and the screen goes back to the Lens selection screen.
Otherwise, the correct adjustment value cannot be obtained, caused by a change of the setting position.

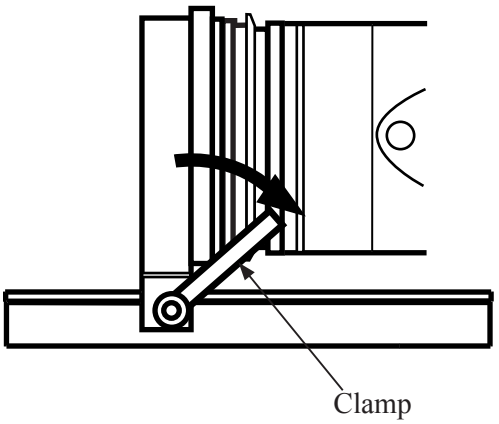
7. Fix the lens with the lens retainer stand.
Refer to "3. Procedure for fixing Lens" on Page A88.

3. Procedure for fixing Lens

1. Attach the adapter (J15380-12) to the lens retainer stand, and move the lens retainer stand in the direction of the arrow.

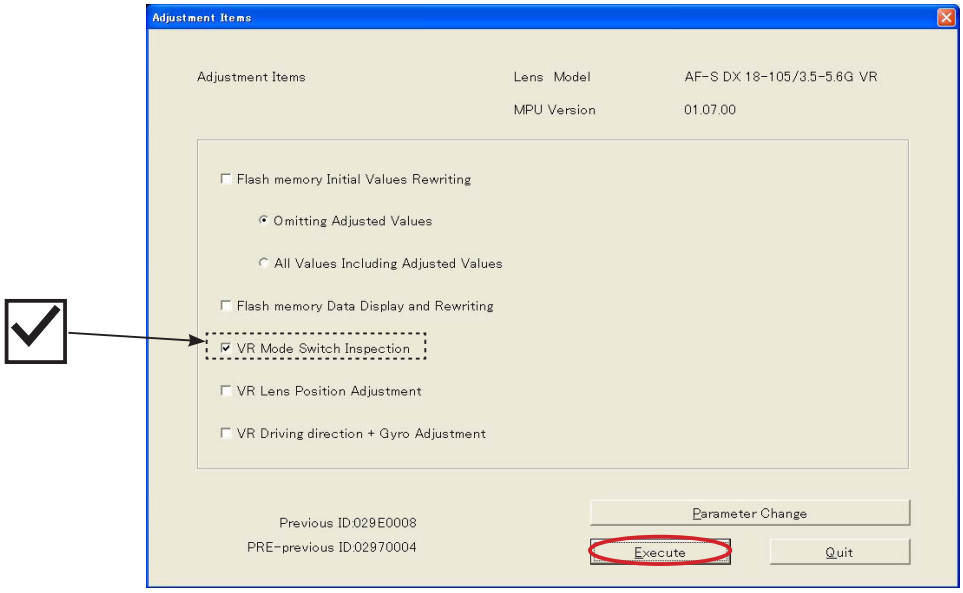


2. Move the lens retainer stand to the position as shown below and fix it by tightening the clamp.



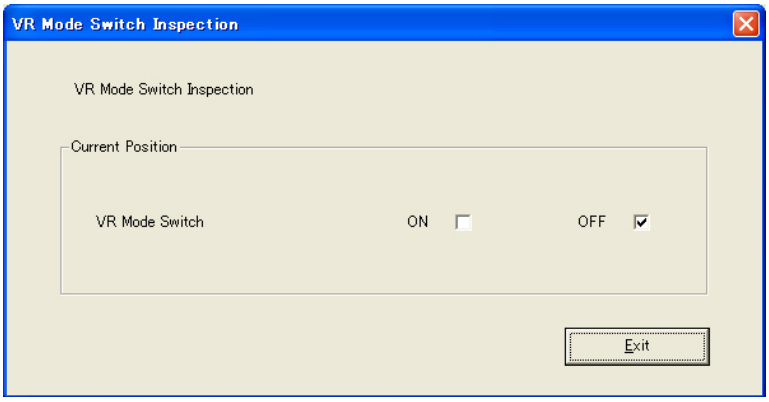
VR mode switch inspection

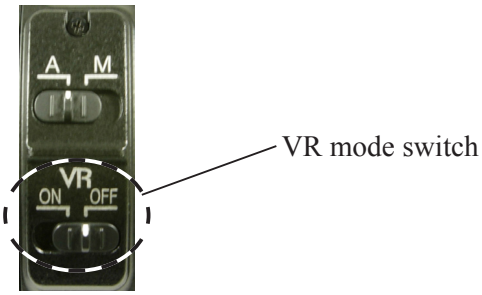
1. Tick "VR Mode Switch Inspection" as below, and click "Execute".



2. The position of the VR mode switch is indicated.

   Selecting the VR mode switch indicates the current position.



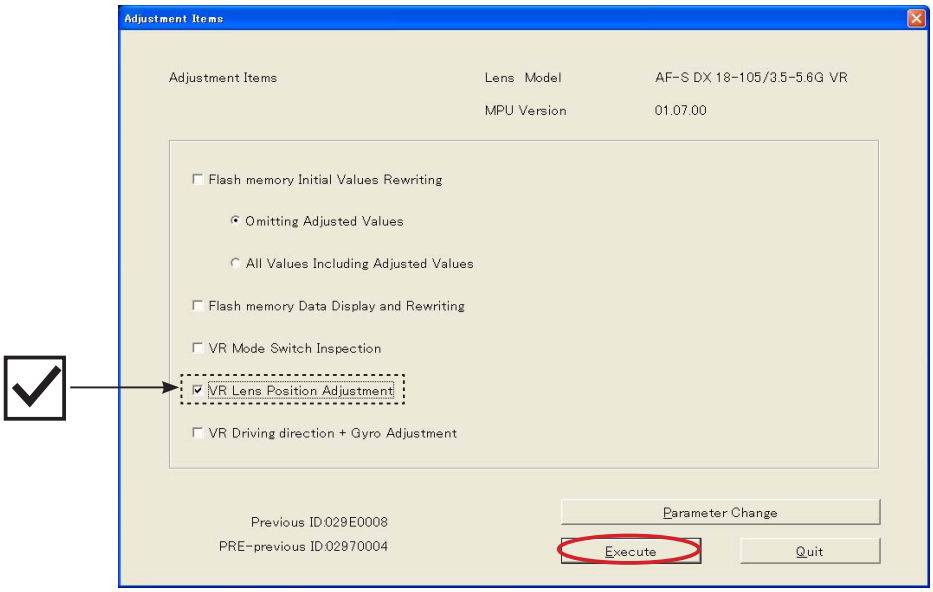


3. When the VR mode switch inspection is completed, click "Exit" to end the procedure.

VR lens position adjustment

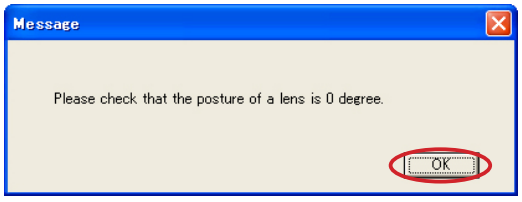
Caution: If "NG" appears during each adjustment, click "Next" to exit from the inspection mode.
After updating FLASH-ROM, go back to the Lens selection screen and make the adjustment again.
However, if "NG" appears even after adjusting a few times, 3-4 lens group unit (VR unit, gyro FPC) main FPC, etc, may be defective.

1. Tick "VR Lens Position Adjustment" as below, and click "Execute".

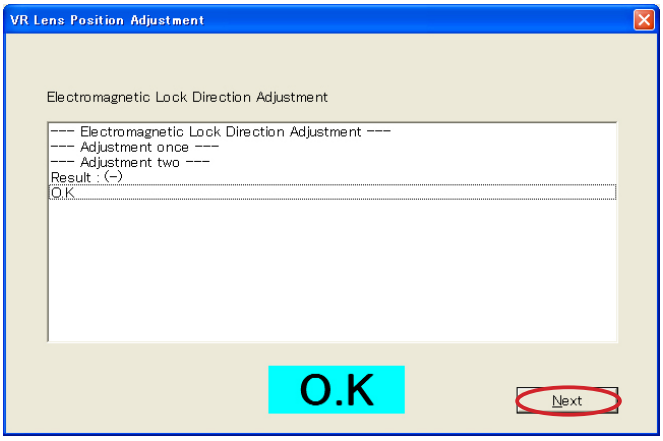


2. When the following message appears, set the VR switch to ON and click "OK".

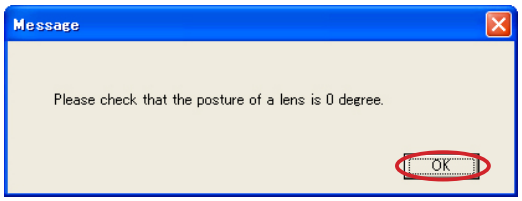
3. When the message window appears, confirm that the angle of the lens position is "0° angle" and click "OK"
Clicking "OK" starts "VCM polarity adjustment (auto control)".
This "VCM polarity adjustment (auto control)" detects the polarity of the VCM (Voice Coil Motor) and writes it in FLASH-ROM as the compensation value.



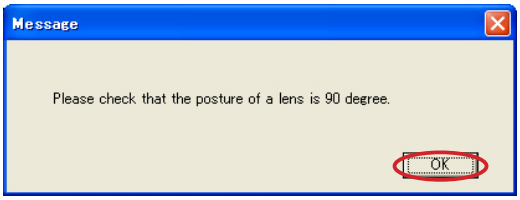
4. If the result is "OK", click "Next".



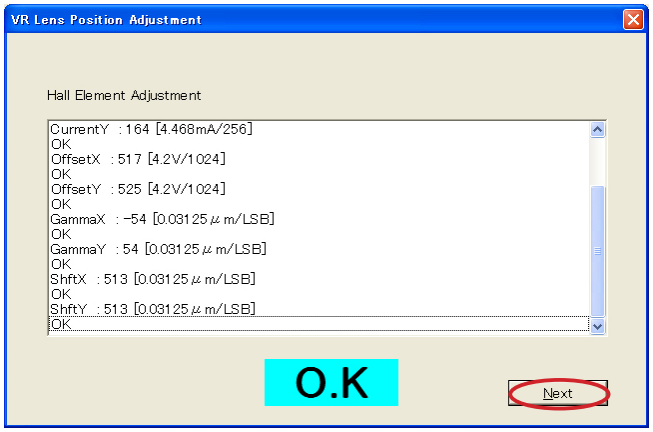
5. When the message window appears, confirm that the lens position is "0° angle" and click "OK".
   Clicking "OK" starts "Hall element-driven current adjustment".



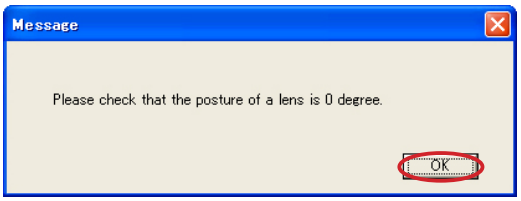
6. When the message window appears, confirm that the lens position is "90° angle" and click "OK".



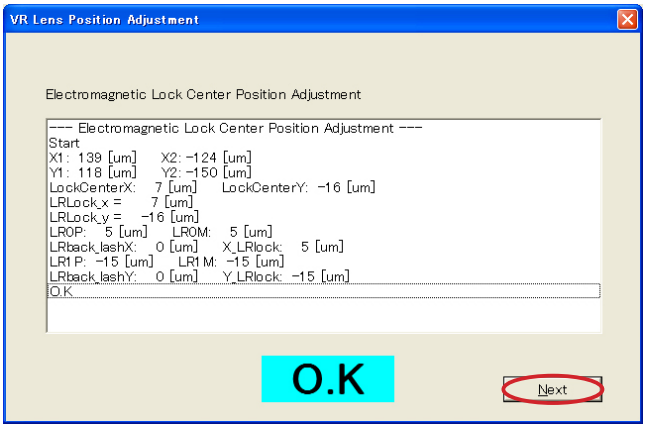
7. If the result is "OK", click "Next".



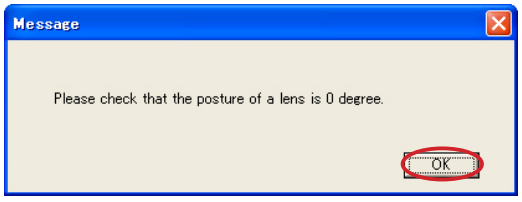
8. When the message window appears, confirm that the lens position is "90° angle" and click "OK".
   Clicking "OK" starts "Electromagnetic lock center position adjustment (Auto control)".
   This "electromagnetic lock center position adjustment" adjusts the center position in the time of electromagnetic lock.



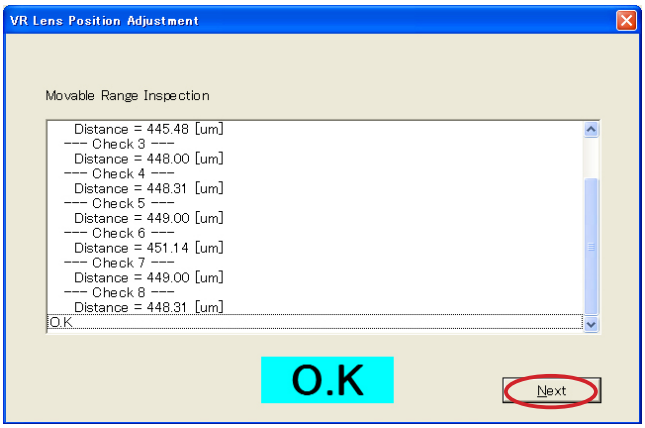
9. If the result is "OK", click "Next". Clicking "Next" starts the "after-adjustment inspection".



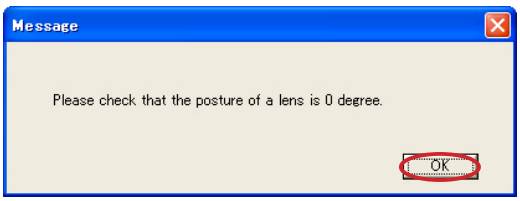
10. When the message window appears, confirm that the lens position is "0° angle" and click "OK".
    Clicking "OK" starts the "after-adjustment inspection".



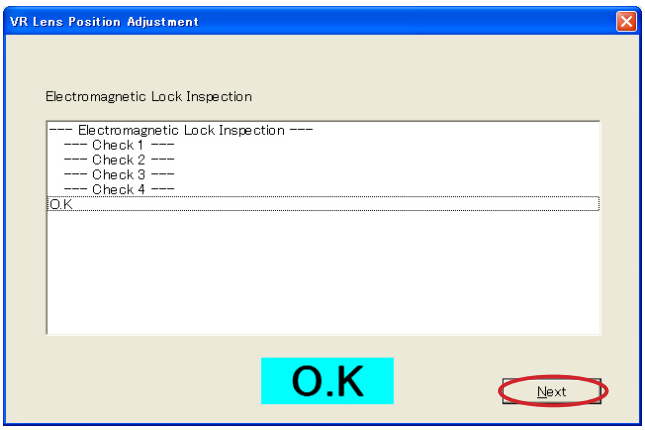
11. When the inspection result is "OK", click "Next".



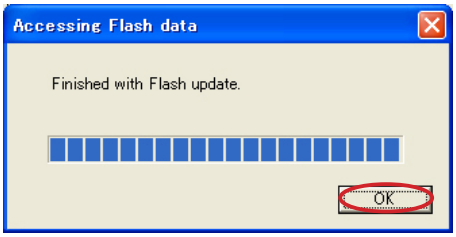
12. When the message window appears, confirm that the lens position is "0° angle" and click "OK". Clicking "OK" starts the "electromagnetic lock inspection".



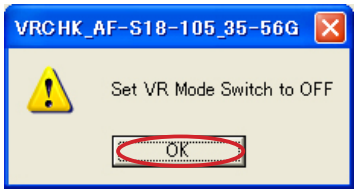
13. When the inspection result is "OK", click "Next".



14. When the message that shows updating FLASH-ROM is finished" appears, click "OK".

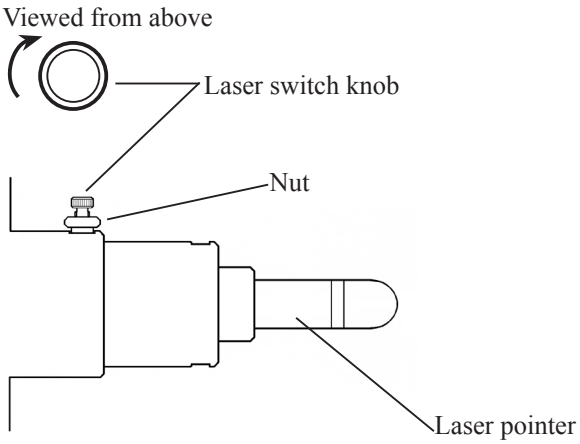


15. When the following message appears, turn the VR switch of the lens to OFF and click "OK".

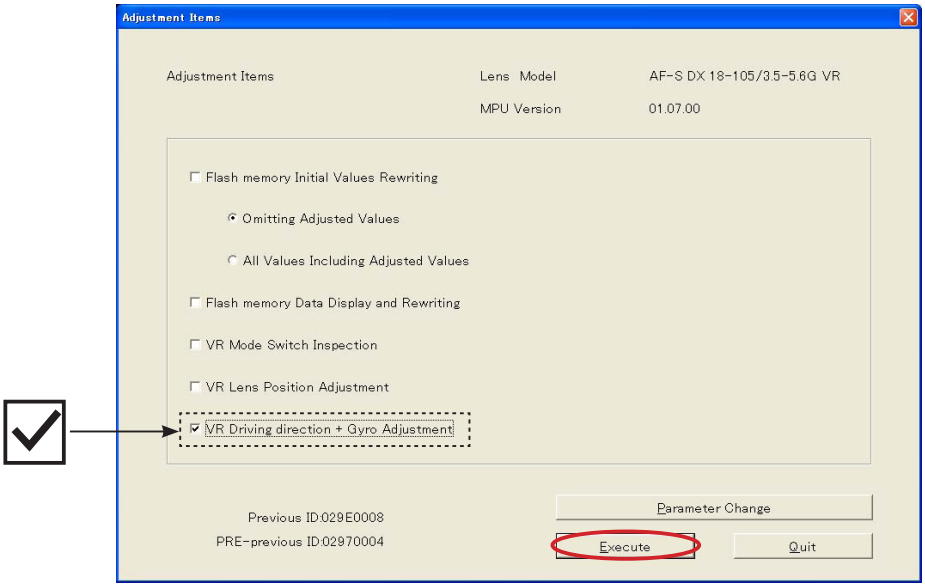


VR Moving Direction + Gyro Adjustment

1. Loosen the laser switch nut of the VR lens adjustment equipment (J15380), and rotate the knob in the direction of the arrow to radiate the laser beam.

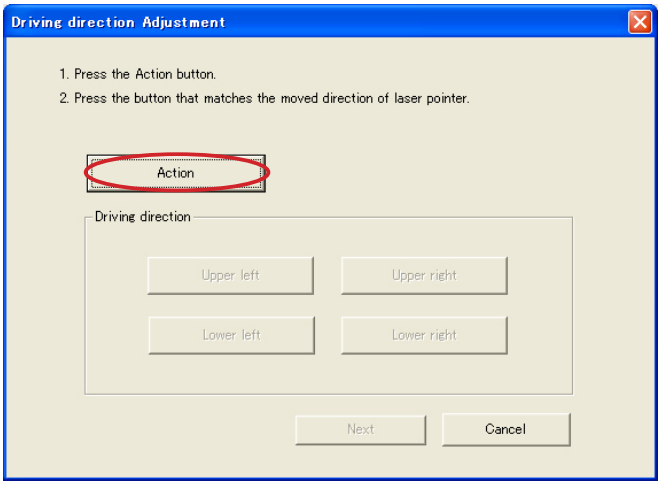


2. Tick "VR Moving Direction + Gyro Adjustment" as below and click "Execute".



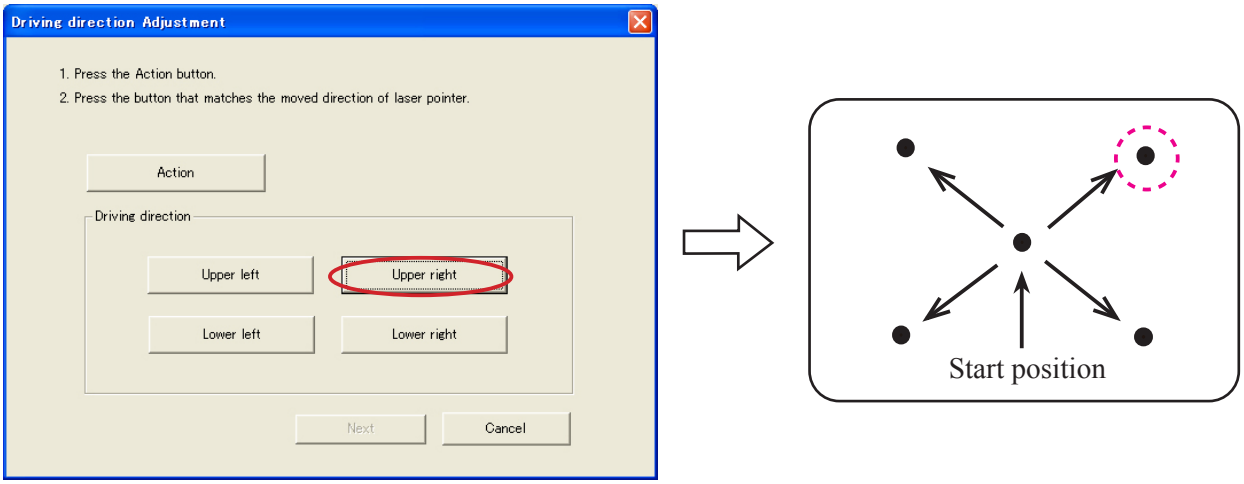
3. Click "Action".

The laser pointer will move in any of the four directions. Confirm the moved direction.

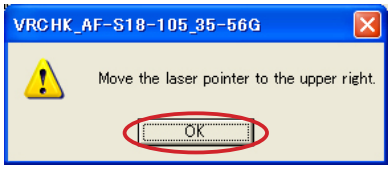


4. Click "OK".

5. Click the button that corresponds to the moved direction of "3".

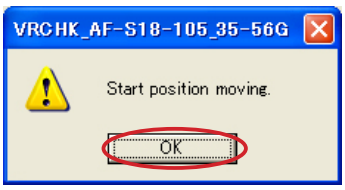


6. Click "OK". Confirm that the laser pointer moves towards the upper-right direction.



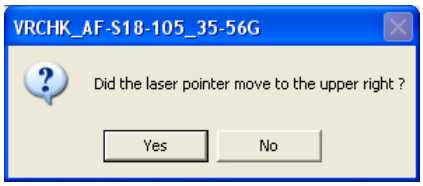
7. Click "OK".

The laser pointer goes to the start position.

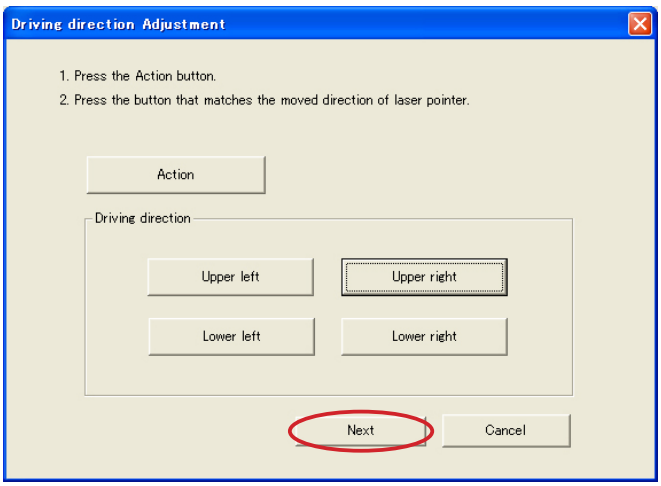


8. If the laser pointer moves towards the upper-right direction, click "Yes".

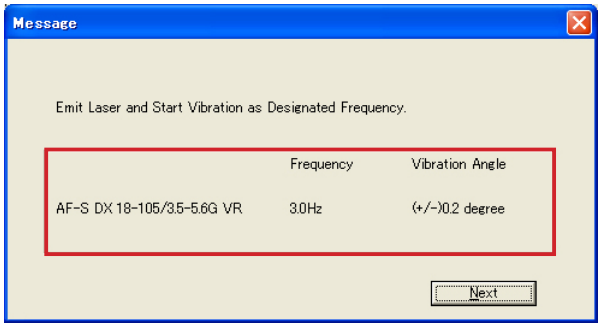
If it does not move towards the direction, click "No" and repeat the procedures from "3." to "7.".



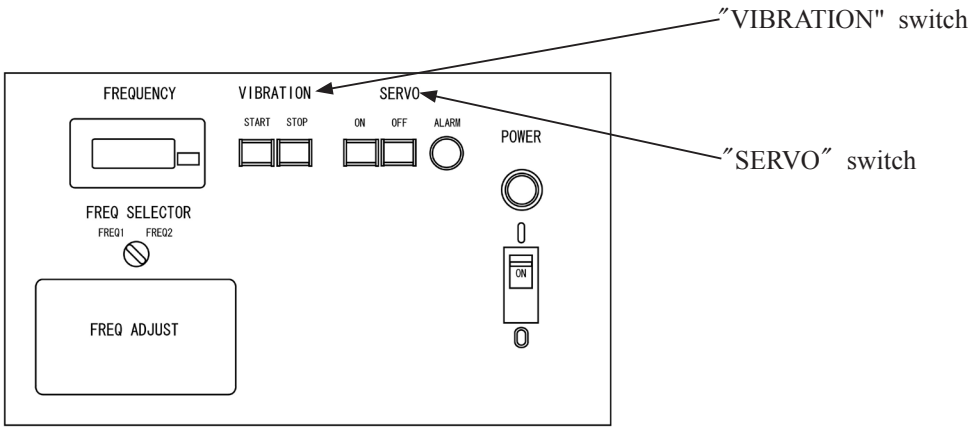
9. When the upper-right movement is confirmed, click "Next".



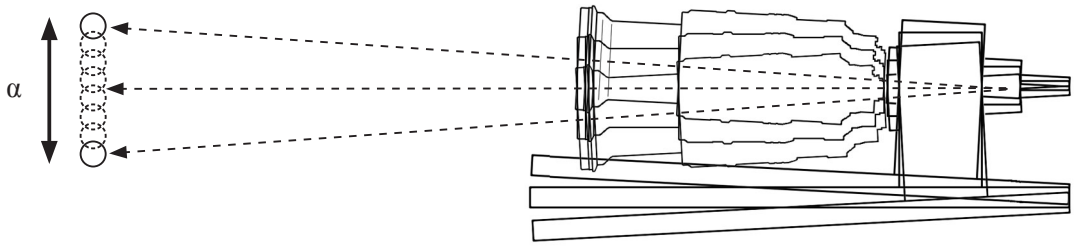
10. When the message window appears, set "Frequency" and "Vibration Angle" setting of the VR lens adjustment, based on the instructions.



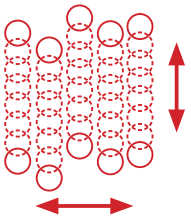
11. Press "ON" button for "SERVO" switch and press "START" for "VIBRATION" switch of the VR lens adjustment equipment (J15380).



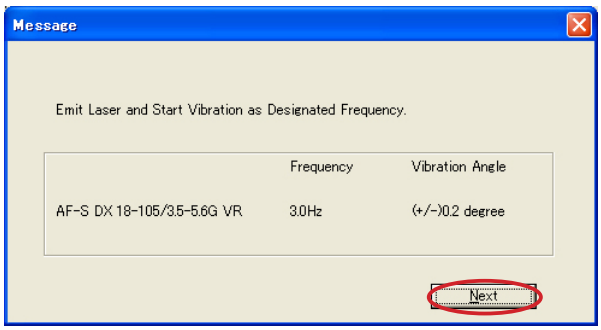
12. When the VR lens adjustment equipment (J15380) starts to vibrate, measure the vibration width (α) of the laser beam.



Note:During the above measurement, laser spot light swings from side to side and up and down.
This phenomenon is caused by operations of the VR unit control so NOT defective.

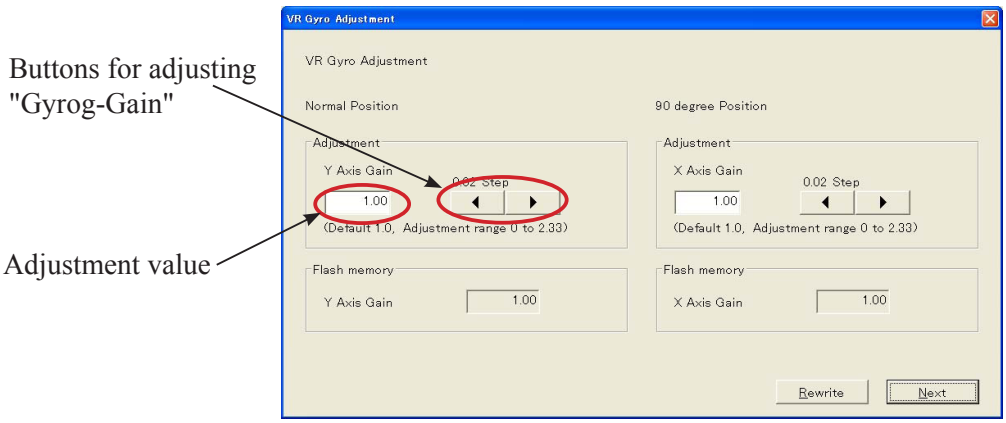


13. Click "Next" on the message window.
The vibration reduction function starts and the vibration width of the laser beam becomes narrow.



14. Adjust the vibration width by the buttons for Gyro-gain adjustment so that the measured vibration width at the center (α′) of the laser beam becomes 1/8 or less of the maximum width.

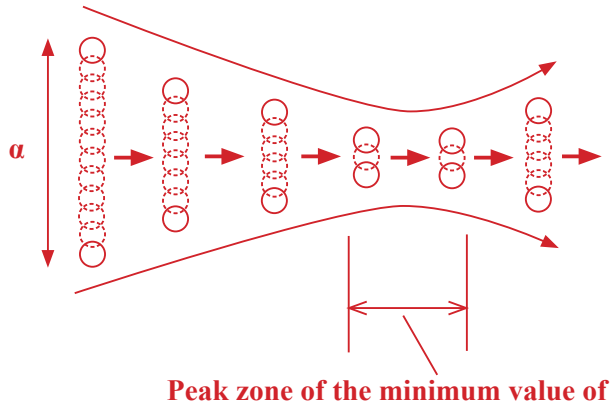
    For how to calculate the center width (α′) and adjustment values, refer to the procedure from ① to ③ on the next page.



Standard:

Center vibration width (α'): One-eighth (1/8) or less of the maximum vibration width

Caution: The laser beam vibrates widely again after passing the peak section of the minimum value.



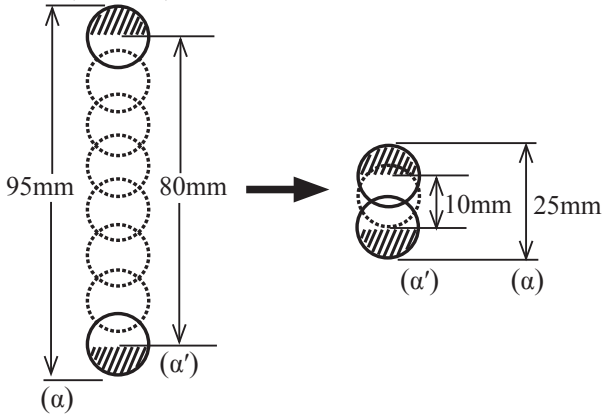
① For adjusting the center vibration width of the laser beam, calculate as follows:

Measure the whole vibration width (α) as in procedure "12." (Page A98). Then, subtract the top and bottom radial parts (shaded areas) of the laser spots from it and work out the center vibration width (α').

《Ref.》 The diameter of the laser spot beam radiated 5-m away is approx. 15 mm.

e.g.)

When the whole vibration width is "approx. 45 mm", the center vibration width is 95-(7.5+7.5)=80 mm. The standard value after the gyro-gain adjustment is 80×1/8=10mm (center vibration width), so the whole vibration width is 10+(7.5+7.5)=25 mm.



② Measure the vibration width by changing the adjustment value in increments of 0.02-Step as below.

③ The peak zone of the minimum vibration width can be obtained by the actual measured value.

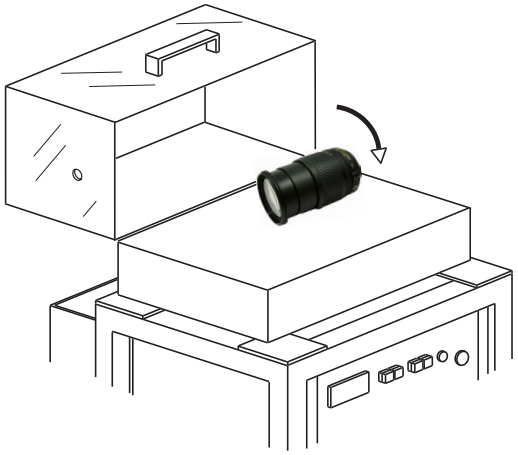
The middle of the peak zone is regarded as the adjustment value.

Gyro gain Adjustment Value	Vibration width Actual mesurement Value
•	•
•	•
0.90	22.5mm
0.92	21.5mm
0.94	21.0mm
0.96	20.5mm
0.98	20.0mm
1.00	20.0mm
1.02	20.0mm
1.04	20.5mm
1.06	21.0mm
1.08	21.5mm
1.10	22.0mm
•	•
•	•

Note: Measure the vibration width in increments of 0.5 mm.

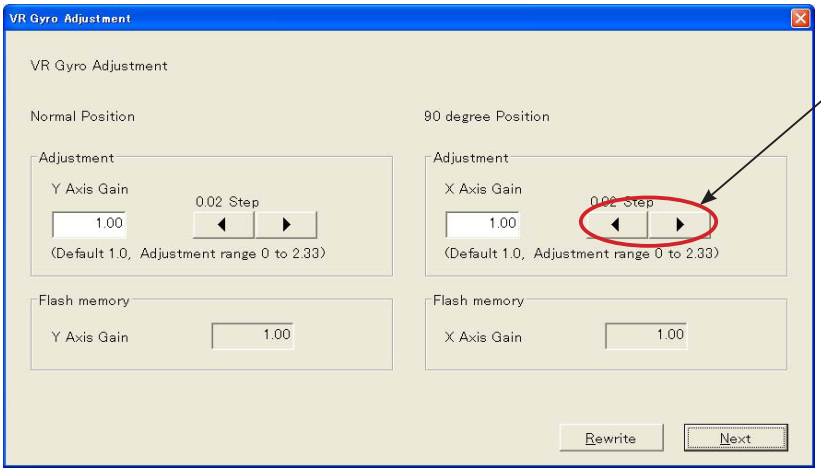
15. Press "STOP" button of VIBRATION switch of the VR adjustment equipment (J15380) to stop vibrations.

16. Rotate the lens through 90° in the direction indicated by the arrow, then press "START" button of VIBRATION switch of the VR adjustment equipment (J15380) to start vibrations.



17. At the 90° position, make gyro-gain adjustment.

Note: When adjusting the lens at the 90° angle position, use the buttons for the adjustment at 90° position as below.



18. After the adjustment, click "Rewrite" button to write the adjustment value in FLASH-ROM of the lens.

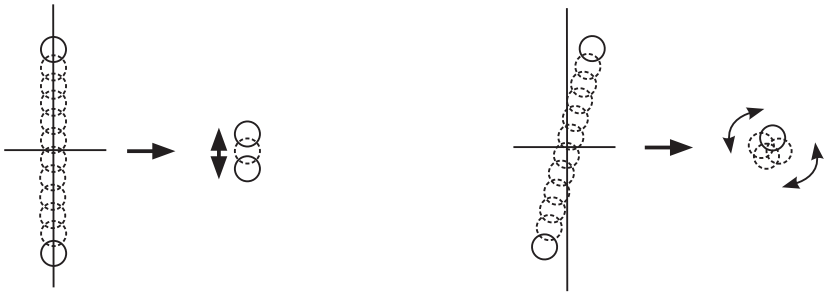
19. When writing is completed, click "NEXT".

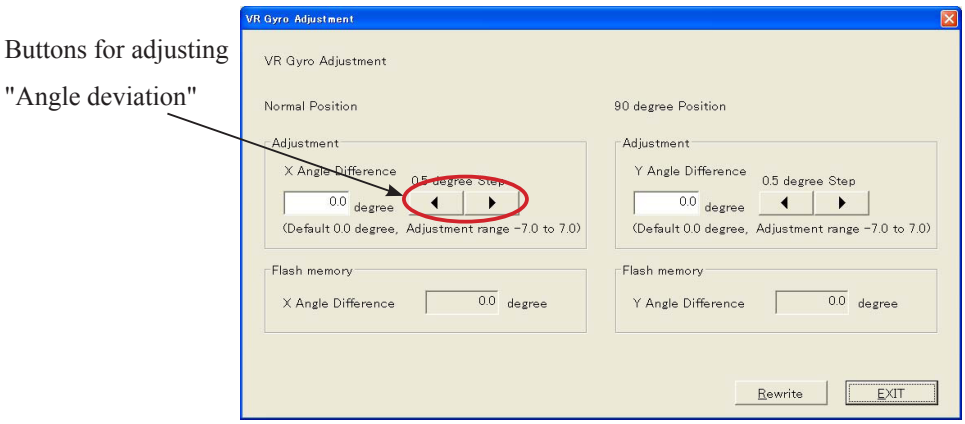
Note: If clicking "NEXT" button without clicking "Rewrite" button, the adjustment value is not recorded and the adjustment details are not written.

20. If the angle is deviated, the laser beam source looks like turning around even after making the Gyro-gain adjustment.

So if such deviation is detected, adjust and correct it by the adjustment buttons.

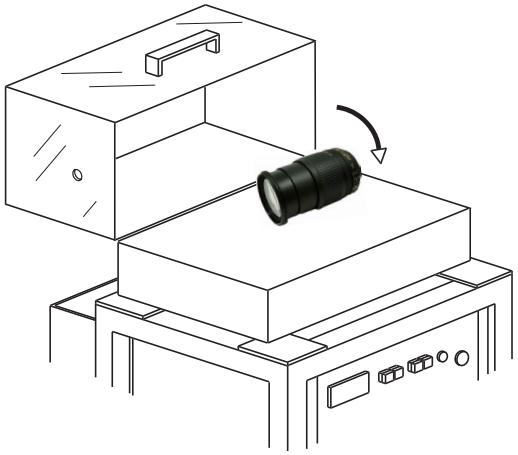
Caution: After using the adjustment buttons, wait for a few seconds until the vibration movement stabilizes.





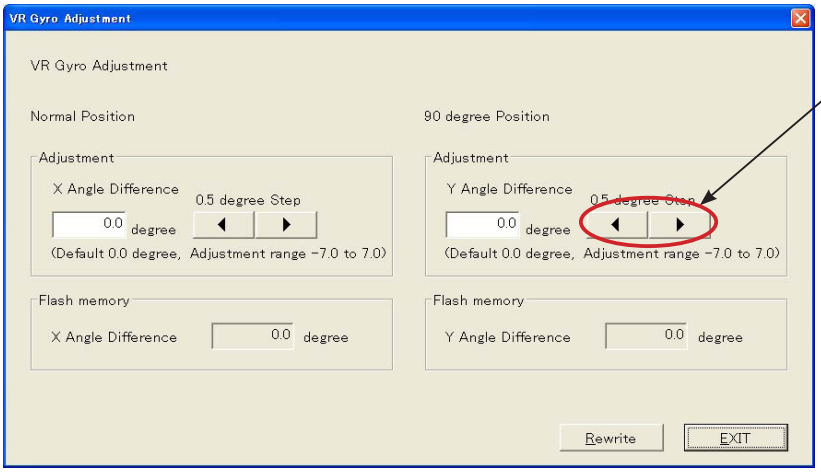
21. Press "STOP" button of VIBRATION switch of the VR adjustment equipment (J15380) to stop vibrations.

22. Rotate the lens through 90° in the direction indicated by the arrow, then press "START" button of VIBRATION switch of the VR adjustment equipment (J15380) to start vibrations.



23. At the 90° position, adjust the angle deviation..

Note: When adjusting the lens at the 90° angle position, use the buttons for the adjustment at 90° position as below.

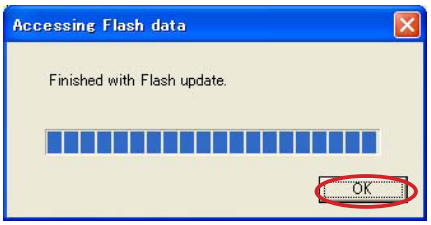


24. After the adjustment, click "Rewrite" button to write the adjustment value in FLASH-ROM of the lens.

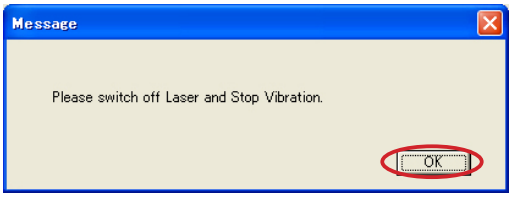
25. When writing is completed, click "EXIT".

Note: If clicking "EXIT" button without clicking "Rewrite" button, the adjustment value is not recorded and the adjustment details are not written.

26. When the message window appears, click "OK".



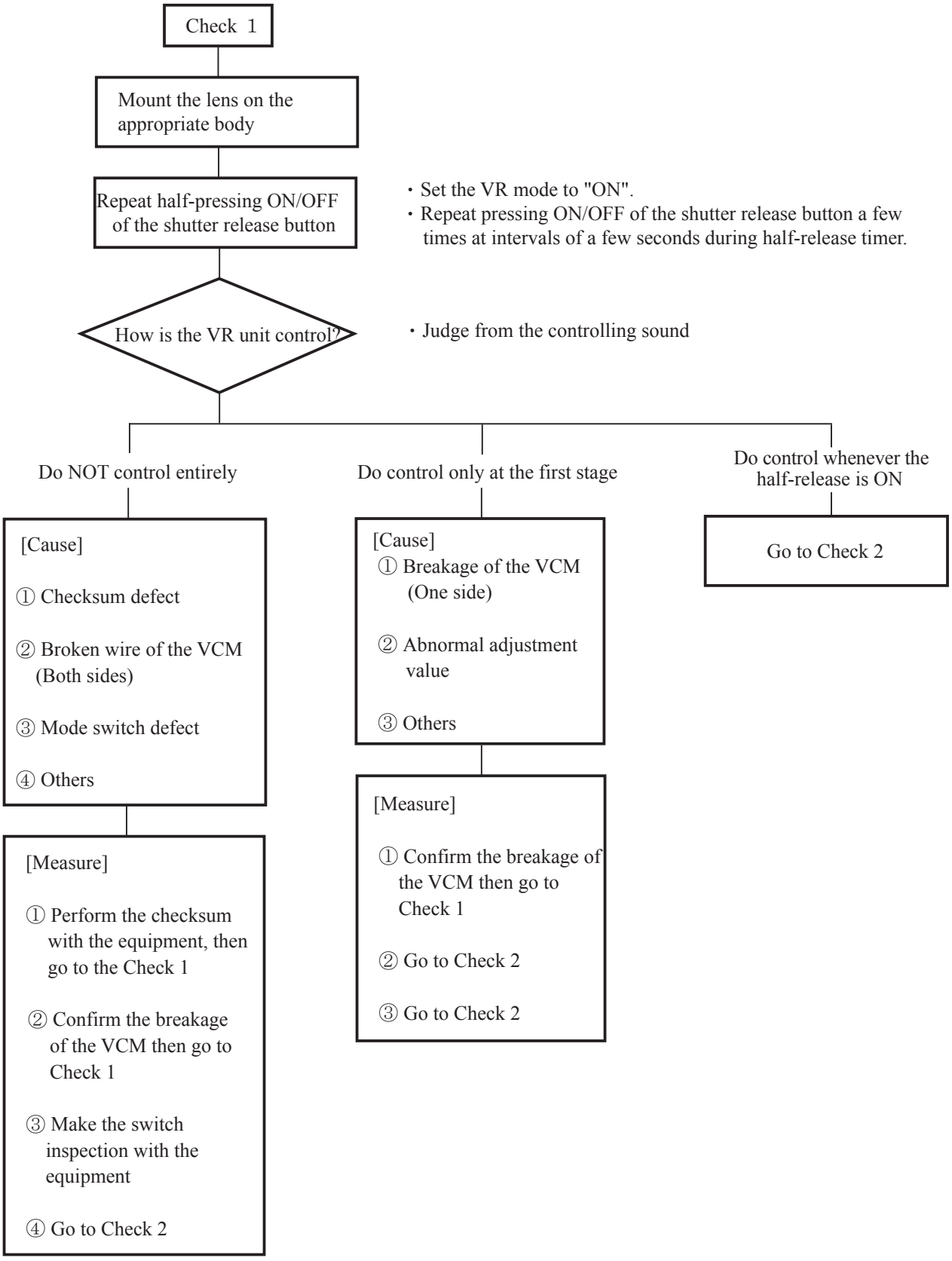
27. When the message window appears, switch off the laser and stop the vibration. Then, click "OK".



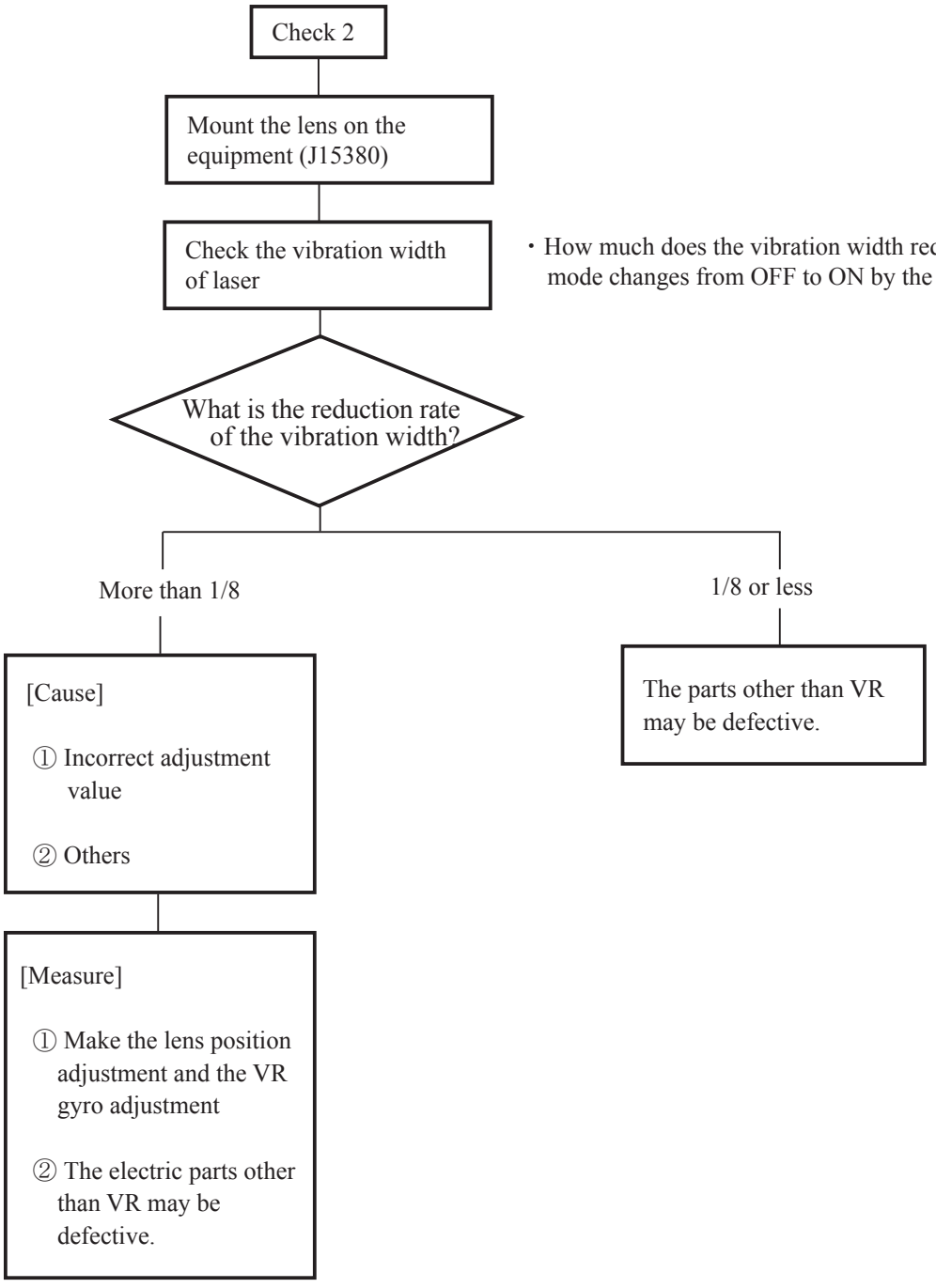
28. Click "Quit" on the adjustment-items screen.

Criteria for VR performance

Before making the VR adjustment for defective products by using the equipment, refer to the following.



Go on to the next page "Check 2"



・How much does the vibration width reduce, when the VR mode changes from OFF to ON by the VR-gyro adjustment?

★ : NEW TOOL

Aberration compensation data-writing adjustment

This adjustment is made by the software which calculates the aberration compensation data according to the aberration feature of lens and writes in the Flash-ROM of the lens, in order to improve the accuracy of autofocus.

Caution:This adjustment is required 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. Preparatiom

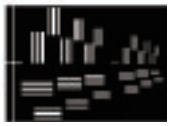
- Test chart (Self-made tool: ref. "2. Procedure for how to create test chart")
- Tripod
- Camera (D200, D2X, or D3)

  Note: In case of using D2X, a compact flash card will be necessary.
- PC
- USB cable (UC-E4)
- Adjustment soft (★ J18456 LWM_AFSDX18_105G.exe : used for the lens optical alignment)

2. Procedure for how to create test chart

- Photocopy the next page and cut out one target chart and five resolution charts.

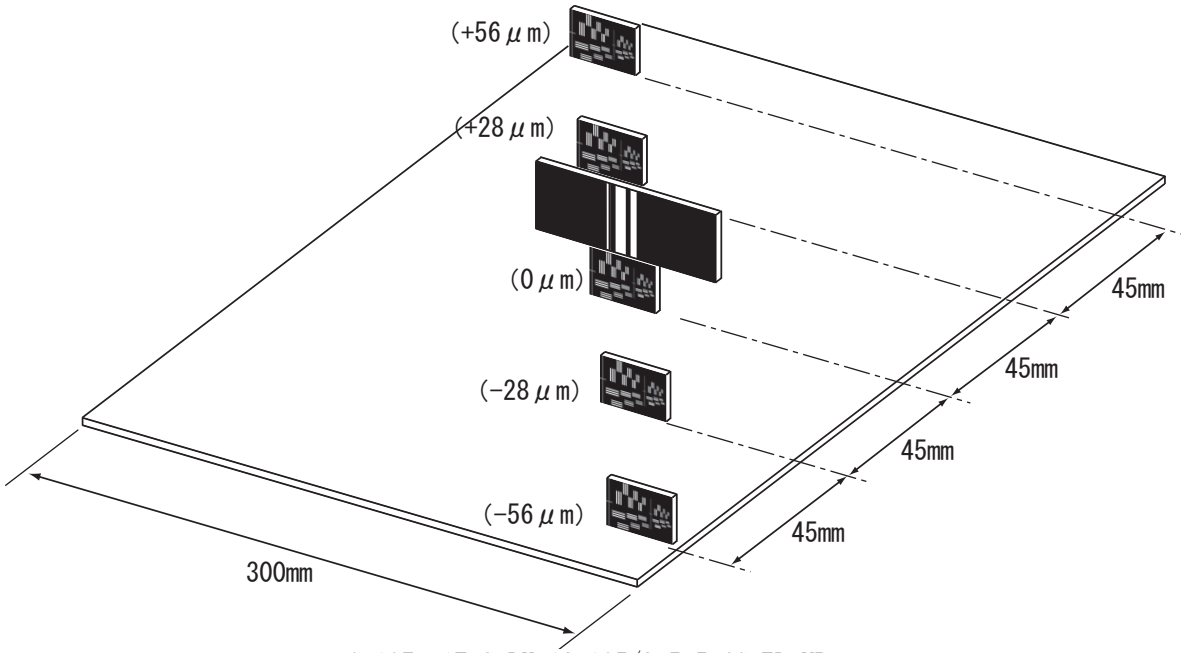
(Target chart)



(Resolution chart)

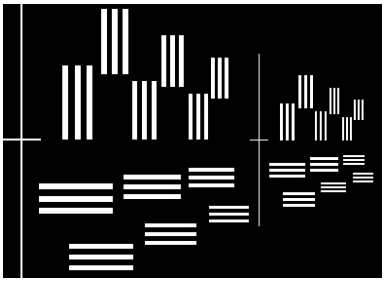
- As shown below, put each chart in position at the specified spacings.

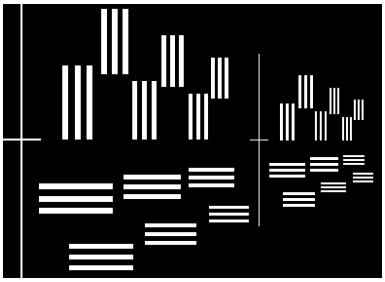
  Caution: Only in the center, put the target chart on the central resolution chart.

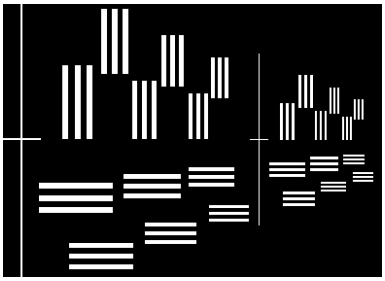


(Target chart)

(Resolution chart)





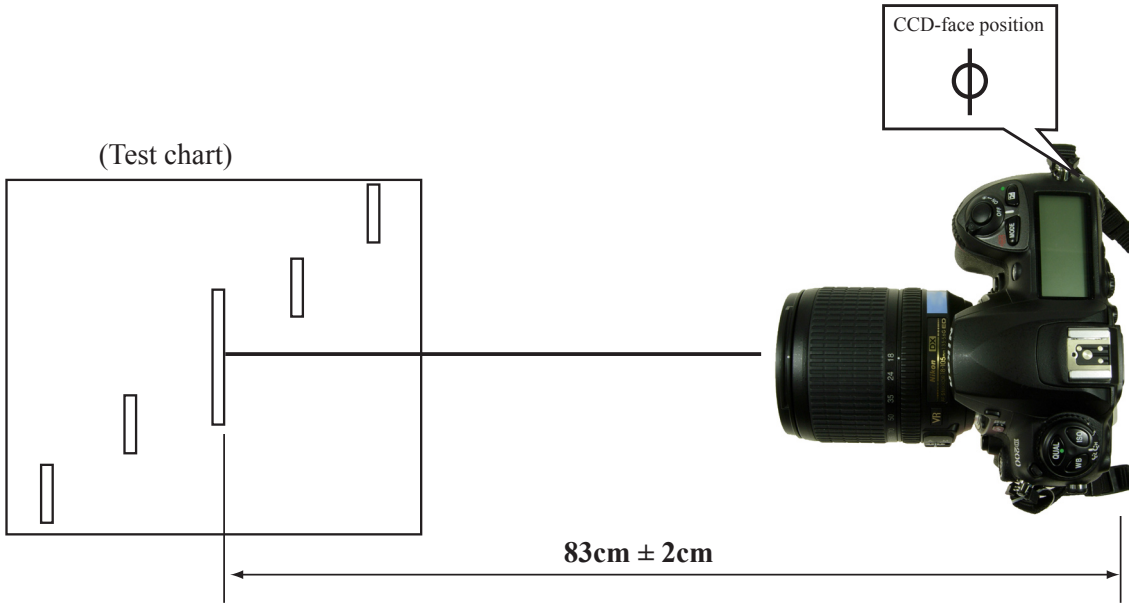


3. Writing aberration compensation data

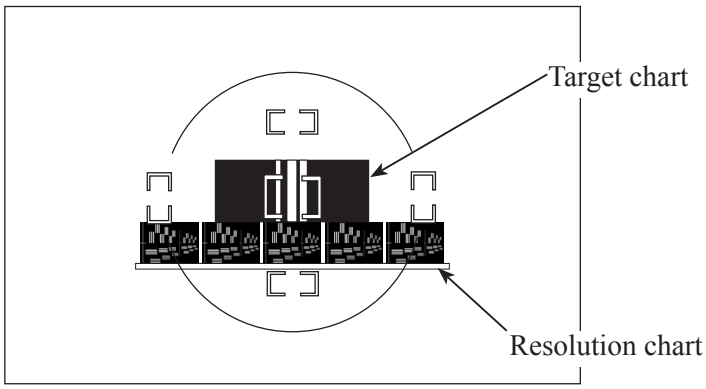
1. Prepare a camera (D200, D2X, or D3). Set the "Exposure mode" to "A", the aperture to full and "Focus mode" to "S".
   On the shooting menu, set the "Image quality mode" to "FINE", "Image size" to "L", "WB" to "Preset", and "ISO" to "200".

2. Set up the camera, to which the suspected lens is attached, on the tripod.

3. Set the focal length to 18 mm, and the distance between the test chart and camera (CCD face) to 83 cm ±2 cm.



4. Set the center of the focus area coming in the target chart as below in viewfinder.

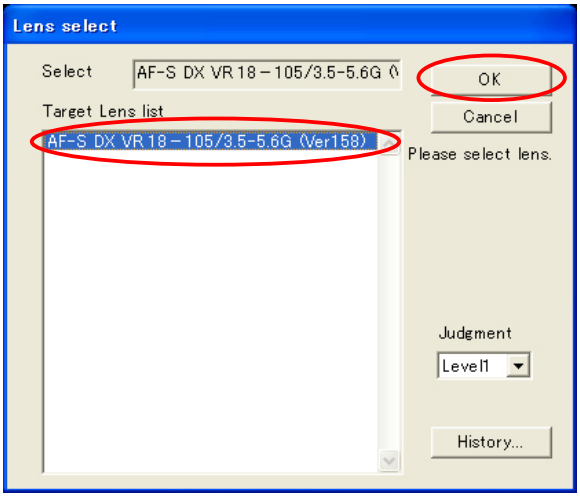


(In viewfinder)

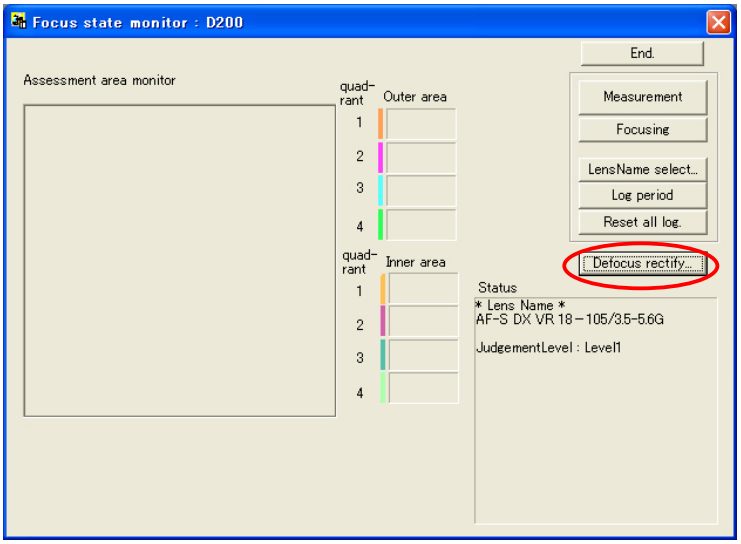
5. Connect the PC and camera via USB cable. (Camera setting: PTP)

6. Start the adjustment software(LWM_AFSDX18_105G.exe).

7. Select "AF-S DX VR 18-105/3.5-5.6G",on the "lens select" screen. Click "OK".



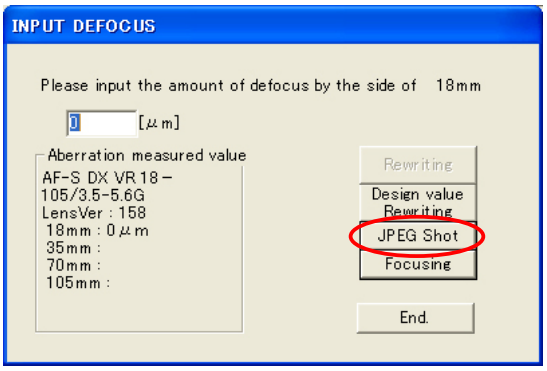
8. Click "Defocus rectify...".



Caution: If the zoom ring is NOT set to 18mm, 35mm, 70mm, or 105mm, the below window will appear, resulting in a failure of proceeding to the following screen. Therefore, be sure to set the zoom ring to 18mm, 35mm, 70mm, or 105mm.

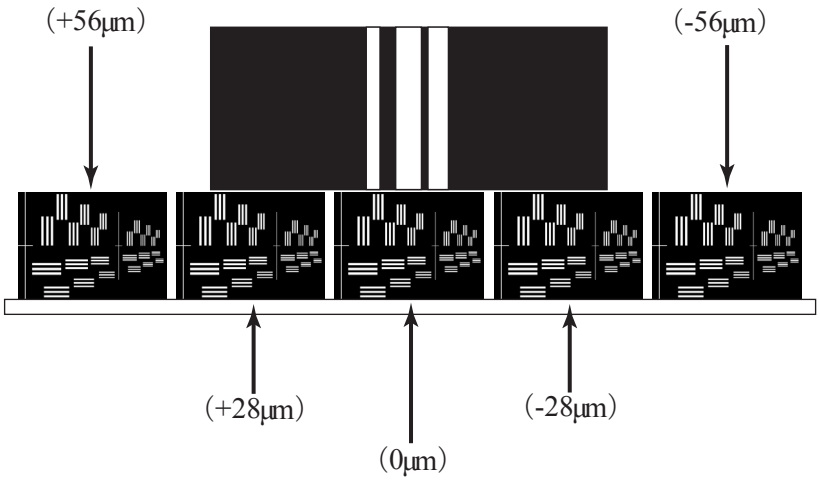
9. Click "JPEG Shot".

The shutter is released after the AF operation. The shot image is automatically displayed on the PC screen.



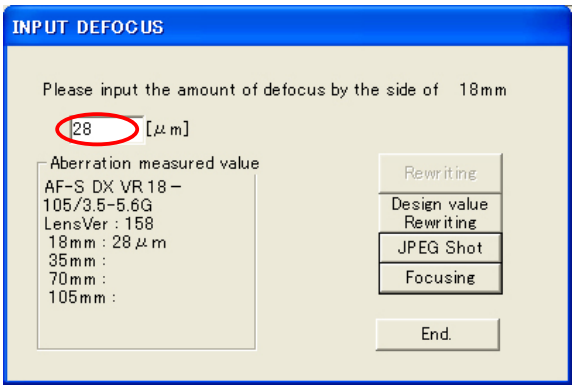
10. Scale the image to 100% and check which chart is in focus of the five resolution charts.

Caution: Because this lens has a deep focal depth even if the aperture is fully open, when looking for the center of focus, compare two distant charts between which there are two or more charts.



11. Input the value data of the focus position into the entry field.

    e.g. The following means "+28μm (rear focus side)"-position is in focus.



12. Regarding the focal lengths (35mm, 70mm, and 105mm), follow the previous procedure from "8." to "10." for each in the same way, and input the value of the focus position, too.

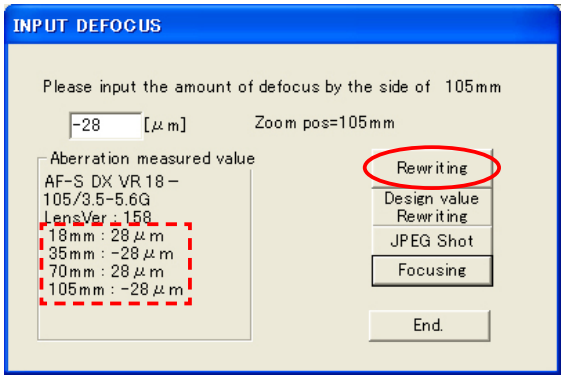
    Set the distance from the test chart to the CCD-face of the camera according to the focal length as follows:

＜ Distance btwn Test chart & CCD-face at focal length ＞

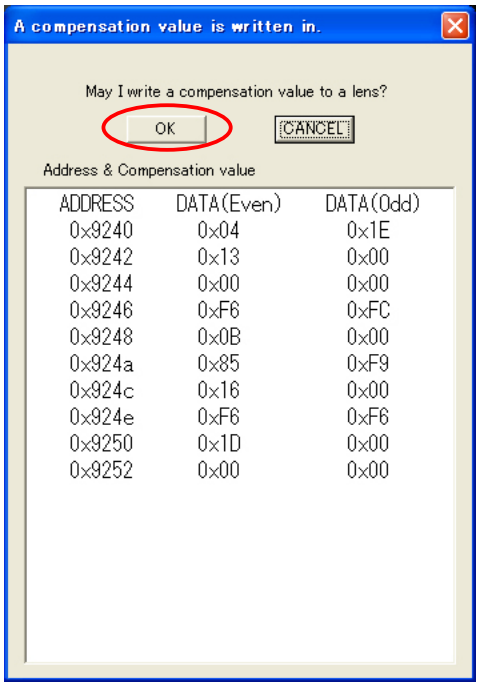
Focal length	Distance from Test chart to CCD-face of camera
18mm	0.83m
35mm	1.4m
70mm	2.8m
105mm	4.0m

13. Check that the values of all the focal lengths are displayed within the dotted red circle.

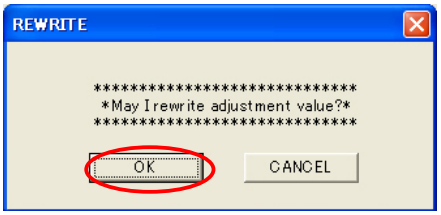
    Then click "Rewriting".



14. When the following screen appears, click "OK".

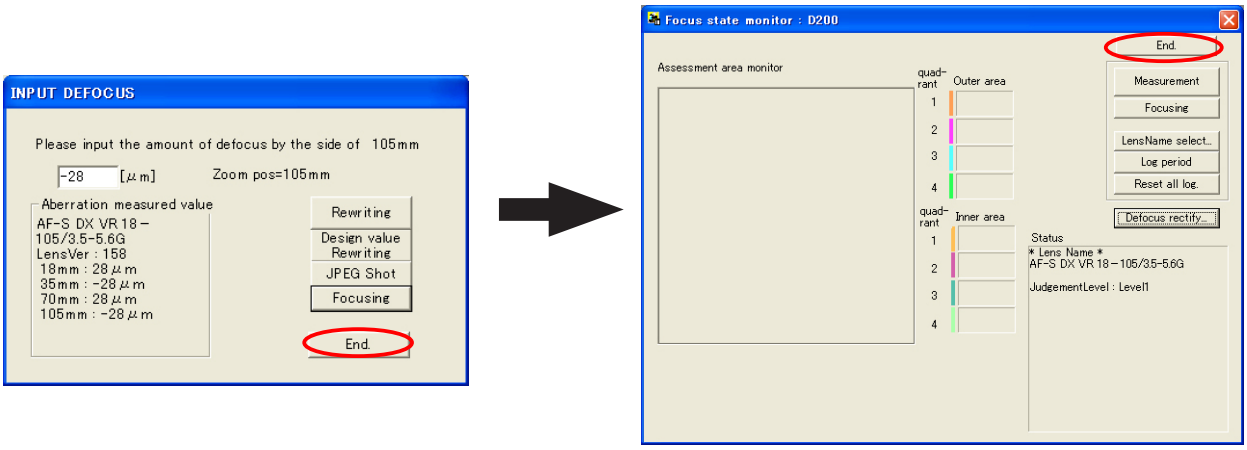


15. Click "OK".



16. When the writing procedure ends and the below screen will appear, Click "OK".

17. Click "OK" to end the adjustment software.



18. Turn the camera OFF and turn it ON again.

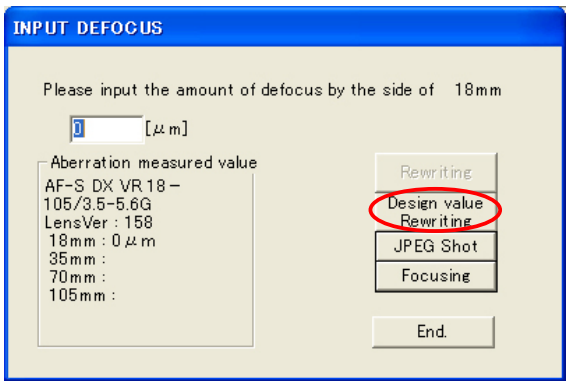
Caution: Unless the camera turns off once, the value that was written in Flash-ROM is not reflected.

19.Regarding the focal lengths (18mm, 35mm, 70mm, and 105mm), repeat the procedure from "6." to "10.", and check that the focus position is at "0μm".

If "0μm"-position is not in focus, repeat the procedure from 2 to 18.

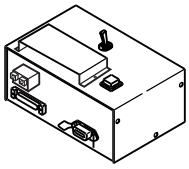
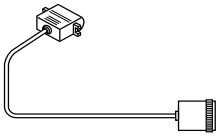
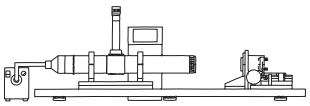
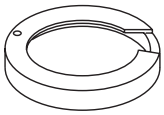
If it is not still in focus even after repetition, the written value in Flash-ROM may be abnormal.

So click "Design value Rewriting" to write the initial value, then proceed with the procedure.

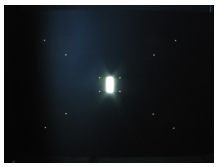


工具 TOOLS

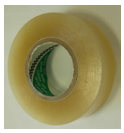
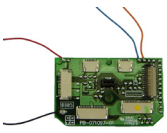
★：新規工具　NEW TOOL

RJ 番号 RJ No.	名称 NAME OF TOOL	備考 OTHERS
J5033 	導電マット CONDUCTIVE MAT	
J5033-5 	リストストラップ WRIST STRAP	
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	
J9001-5N-1 	安定化電源５Ａ DC REGULATED POWER SUPPLY 5A	
DL1640 	デジタルオシロスコープ OSCILLOSCOP DL-1640	
工具設定なし RJNo.is not available	パーソナルコンピューター PERSONAL COMPUTER	
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	
J15430 	横型焦点面検査器 AT-500H BACK FOCUS COLLIMATER	
J15380	ＶＲレンズ調整装置 INSPECTION TOOL FOR VR LENS	
J18004-1 	Ｊ１８００４用基準ゲージ STANDARD GAUGE FOR J18004	
J11360 	AF 接点ピン位置確認工具 Inspect AF-contact pin position	

★：新規工具　NEW TOOL

	RJ 番号 RJ No.	名称 NAME OF TOOL	備考 OTHERS
	J19129 	調芯装置用スライドレール LENS ALIGNMENT EQUIP.SLIDE RAIL	
	J19134 	調芯装置用チャート（D3 対応） LENS ALIGNMENT CHART FOR D3	
	J19128A 	ライトビューアー（J19134 用） LIGHT VIEWER (J19134)	
★	J18454 	AF-S DX ED VR 18-105/3.5-5.6G 調整用ソフト Adj.SOFT for AF-S DX VR 18-105/3.5-5.6G	
★	J18456 	AF-S DX ED VR 18-105/3.5-5.6G 調芯調整用ソフト Adj.SOFT(LWM) for AF-S DX VR 18-105/3.5-5.6G	
★	J18457 	AF-S DX ED VR 18-105/3.5-5.6G VR 調整用ソフト Adj.SOFT(VR) for AF-S DX VR 18-105/3.5-5.6G	
	J19127T 	AF-S 16-85 用ホルダー ATTACHMENT HOLDER FOR AF-S 16-85	AF-S VR 16-85 用 FOR AF-S VR 16-85
	J11339 	AF-S VR 70-300 無限ピン AF-S VR 70-300 INFINITY PIN	AF-S VR 70-300 用 FOR AF-S VR 70-300
★	J5413 	基準ピン（1mm） Reference pin (1mm)	3 本必要 Three pins required.
★	J11363 	AF-S VR 18-105 2 群回螺器 Wrench for 2G AF-S VR 18-105	
★	J11364 	トルクドライバー RTD260CN TORQUE DRIVER RTD260CN	
	MZ-400EL	ドライサーフ　MZ-400EL DRY SURF MZ-400EL	
	PL-22SEL	ドライサーフ　PL-22SEL DRY SERF PL-22SEL	

★：新規工具　NEW TOOL

RJ 番号 RJ No.	名称 NAME OF TOOL	備考 OTHERS
OS-30MEL 	ドライサーフ　OS-30MEL DRY SERF OS-30MEL(OIL BARRIER)	
GP-1RS	グリース GP-1RS GREASE GP-1RS	
RR	ラバーグリース RR RUBBER GREASE RR	
L-241 	ロックタイト #241（青） LOCTITE #241	
EDB0011 	ネジロック（赤）1401C SCREW LOCK 1401C	
SX720B 	セメダイン　SX720B（黒） CEMEDINE SX720B(BLACK)	
M300S	ザヴィーナ ミニマックス SAVINA MINI MAX	
TA-0008 		ポリエステルフィルム Polyester Film
TA-0018 		ポリエステルフィルム Polyester Film
TA-0020 		カプトンテープ Kapton Tape
★自作工具 	自作工具 SELF-MADE TOOL	1S020-557