

作成承認印

配布許可印



AF-S Zoom-Nikkor 80-200mm f/2.8 D IF

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

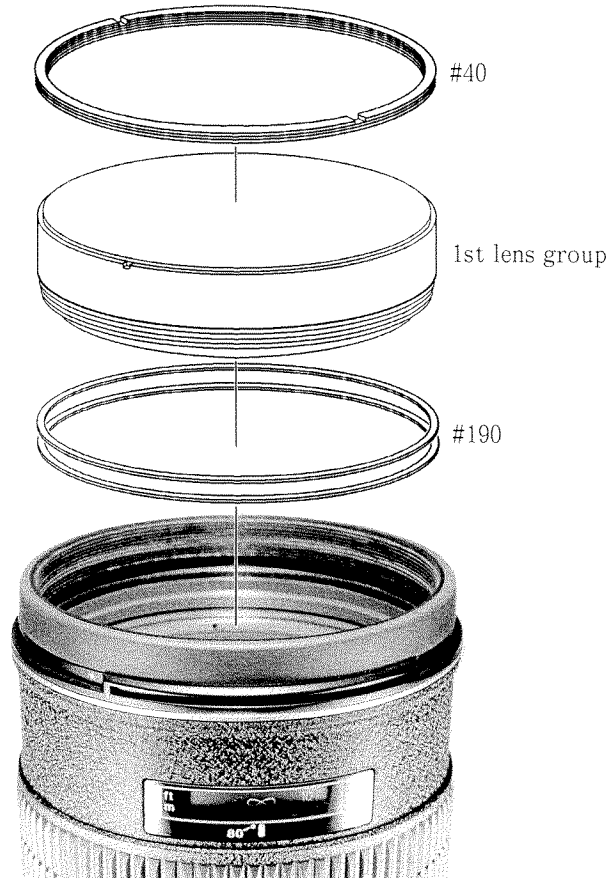
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DISASSEMBLING / ASSEMBLING / ADJUSTMENT

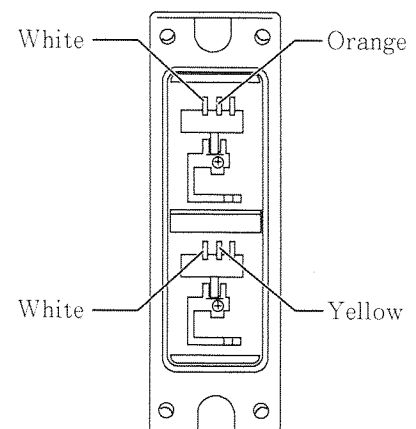
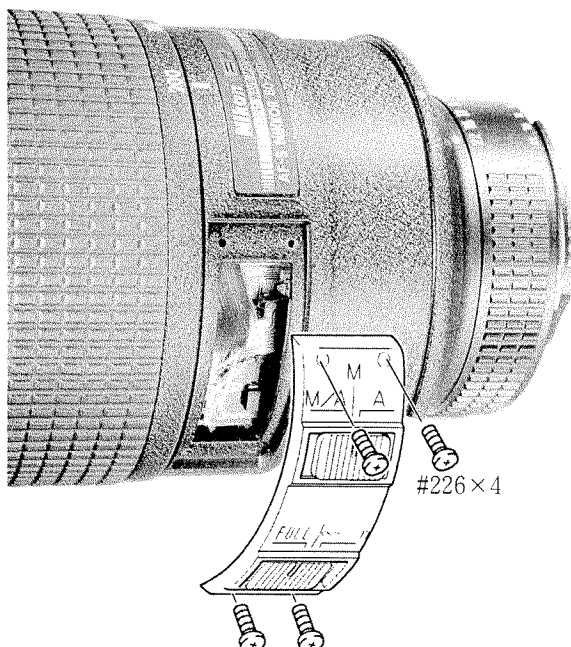
1. DISASSEMBLING

- Remove the tripod socket prior to disassembly.

1st LENS GROUP



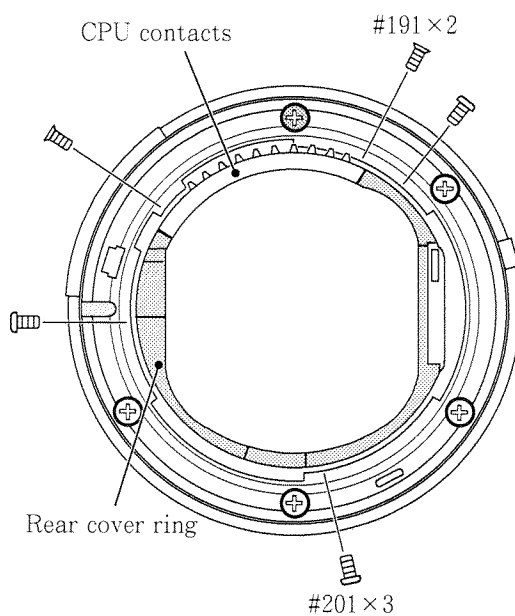
CHANGE-OVER SWITCH UNIT



REAR HOUSING



REAR COVER RING

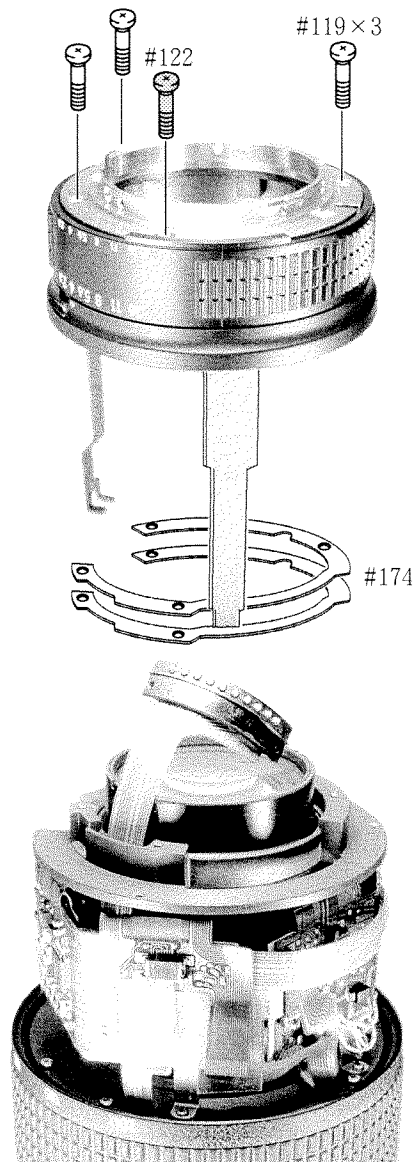


Caution : The rear cover ring can not be removed by removing 3 pieces of the screw #201 alone.

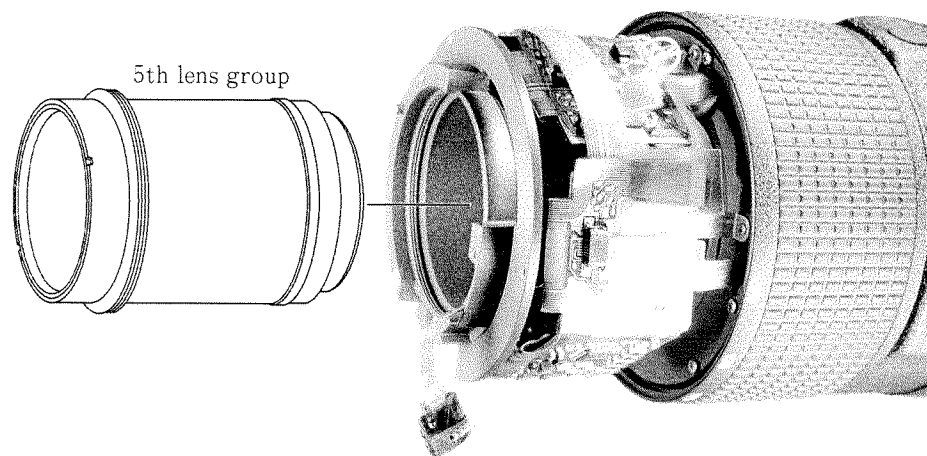
Removal of the rear cover ring is made possible by removing 2 pieces of the screw #191 and raising the CPU contacts.

Then, in order to avoid cutting off the FPC from the CPU contacts, slowly lift up the rear cover ring and then remove it.

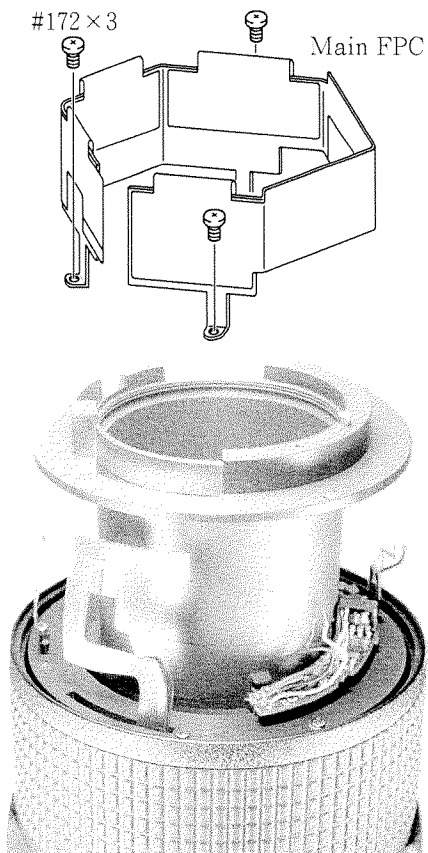
APERTURE RING UNIT



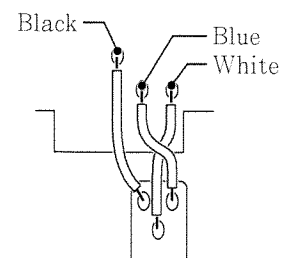
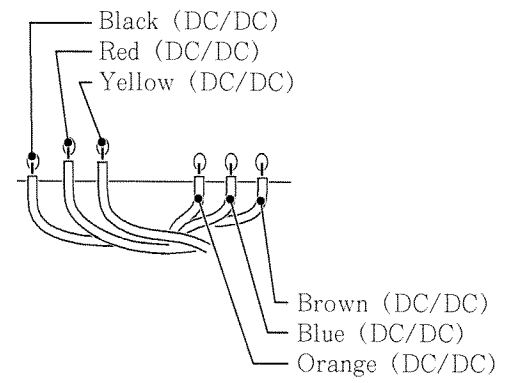
5th LENS GROUP



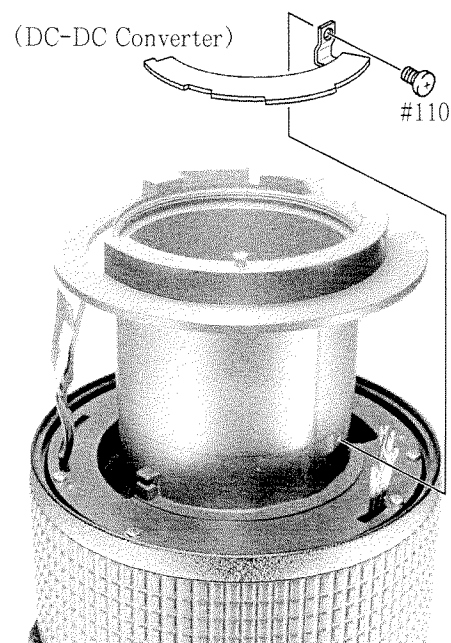
MAIN FPC



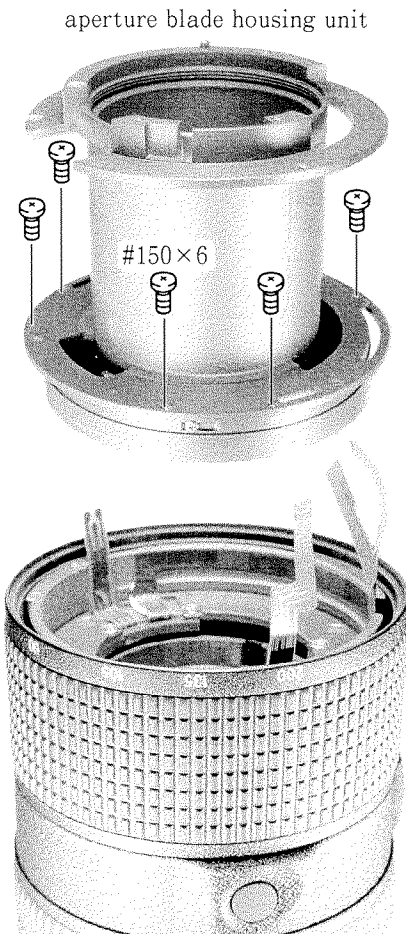
- Remove the four connectors and wirings described below.



DC-DC CONVERTER

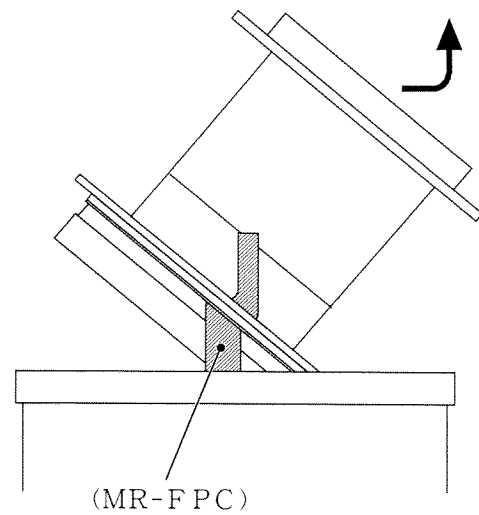


APERTURE BLADE HOUSING UNIT

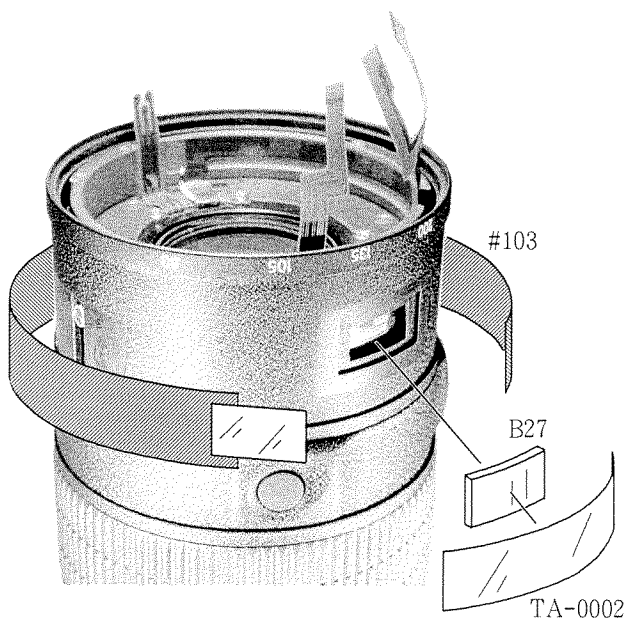


Caution : For removing the aperture blade housing unit, as shown below, avoid to cut off the MR-FPC.

If the MR-FPC is cut away, the whole MR encoder unit must be replaced.



ZOOM ENCODER BRUSH



- After removing the rubber ring #37, remove the zoom encoder brush.

ZOOM RING

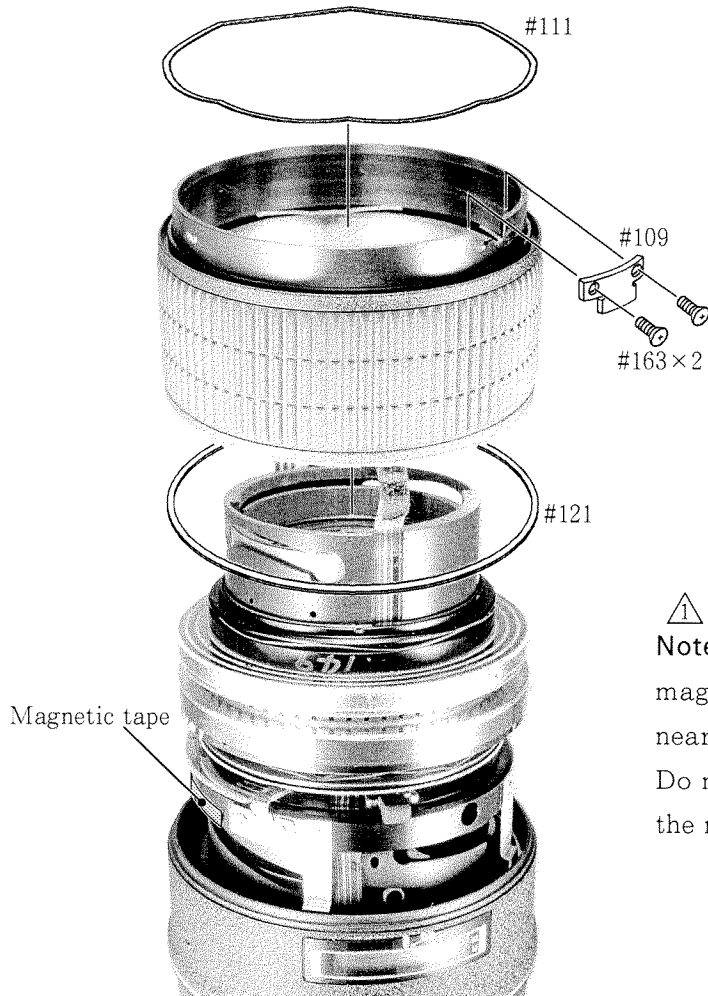


- Remove each 2 pieces of the guide ring #135 and #136. Then, rotate the zoom ring in the arrow direction and remove it.

AF LOCK RING



COUPLING KEY #109



△ (Addition)

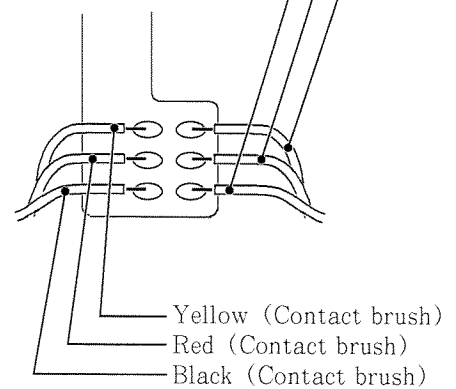
Note : Due to a cause to damage the magnetic data, do not place any magnet near the magnetic tape.

Do not set anything magnetic to touch the magnetic tape either.

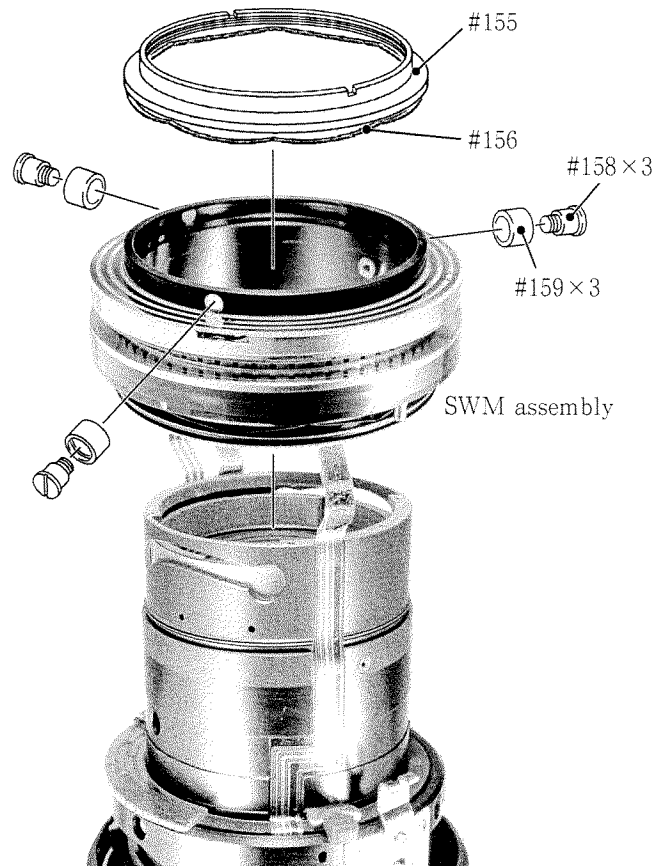
CONTACT BRUSH



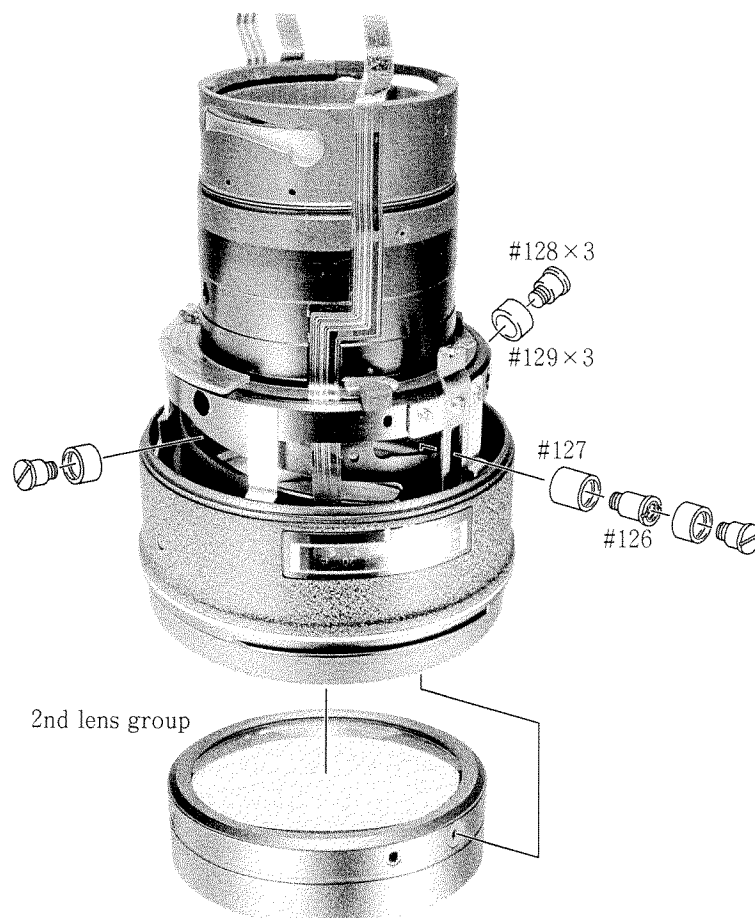
Yellow (Contact brush)
Red (Contact brush)
Black (Contact brush)



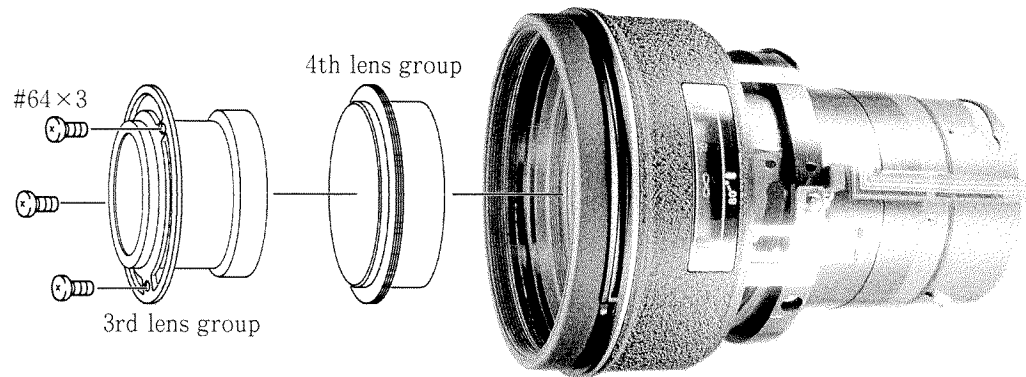
SWM ASSEMBLY



2nd LENS GROUP



3rd, 4th LENS GROUP

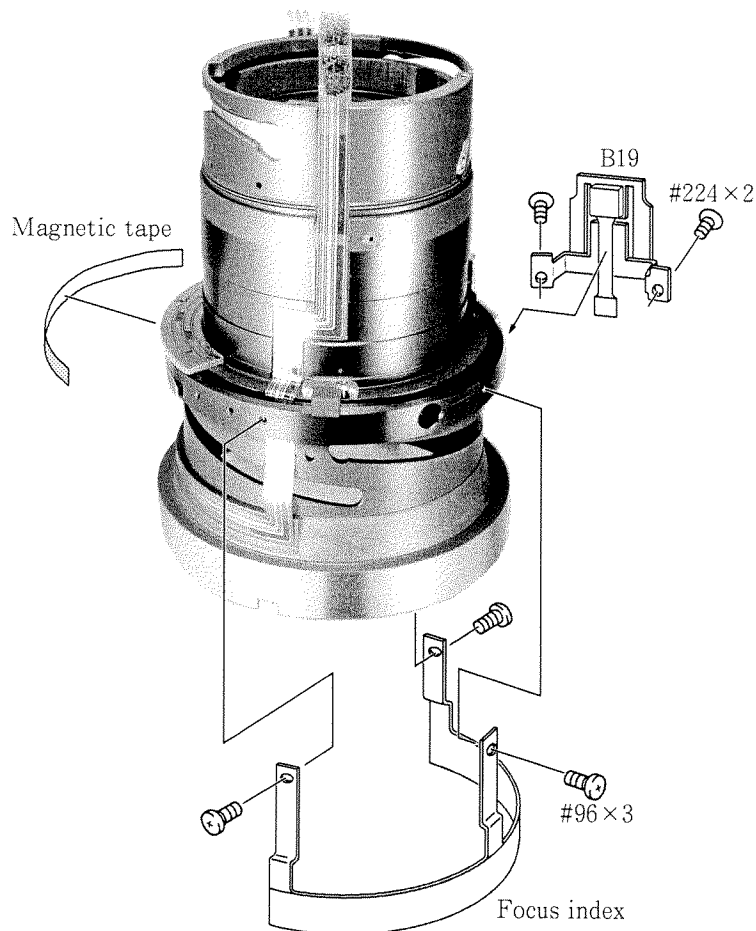


FILTER RING GROUP



2. ASSEMBLING / ADJUSTMENT

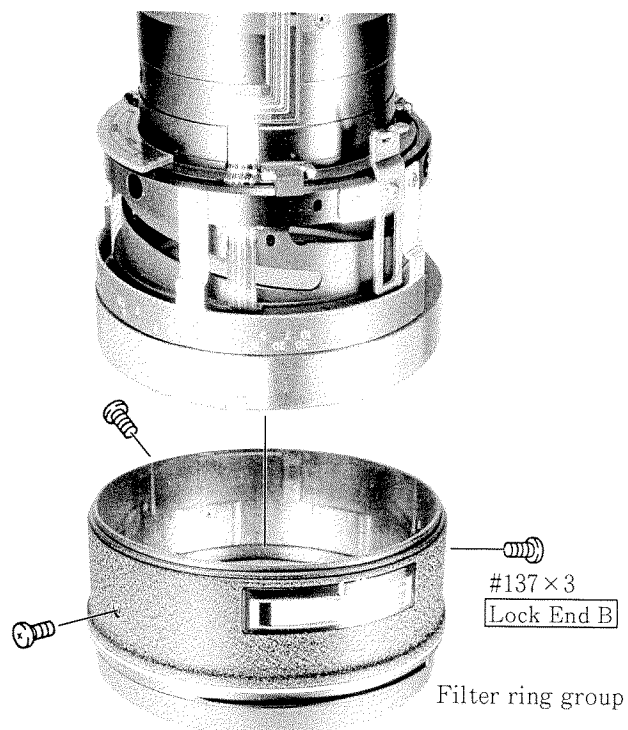
FOCUS INDEX



△ (Addition)

Note : Due to a cause to damage the magnetic data, do not place any magnet near the magnetic tape. Do not set anything magnetic to touch the magnetic tape either.

FILTER RING GROUP



INSPECTION AND ADJUSTMENT FOR THE WAVEFORM OUTPUT FROM MR ENCODER

- In case of replacing the MR tape or the MR head, be sure to conduct adjustment.

1. Equipment and tools to be required

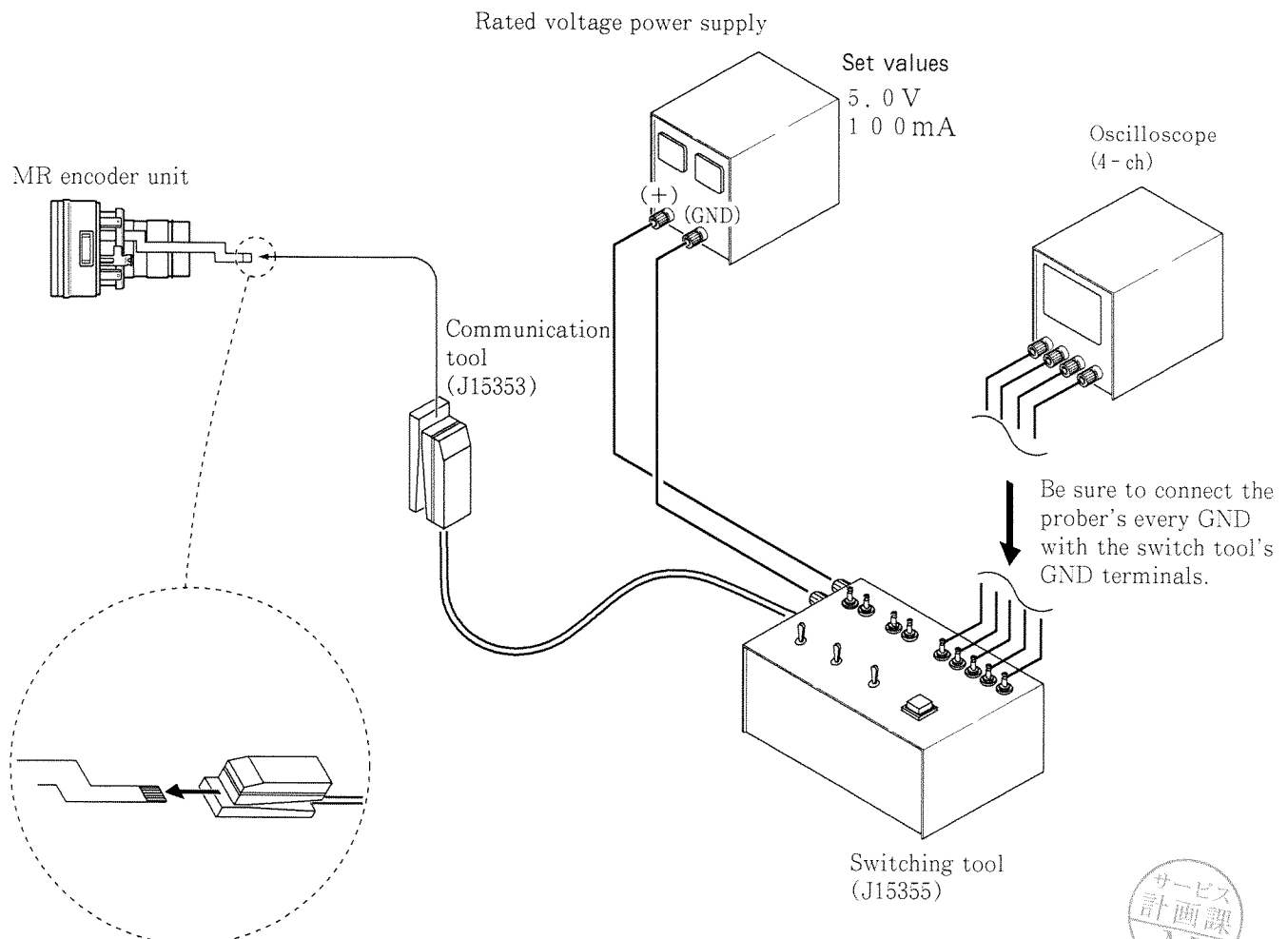
- Rated voltage power supply for single output : Q'ty 1 With 5.0 V and 100 mA, applicable for the switch tool
- Oscilloscope : 1
- Communications tool J15352 : 1
- Switch tool J15355 : 1

Note : In case of any trouble in conduction between the communications tool and the relay FPC, there may be corrosion or oxidation on the contact surface of relay FPC.

In this accord, be sure to polish the contact surface prior to getting connected with the communications tool.

2. Preparation of the lens applicable for measurement

- As shown in the figure below, connect the rated voltage power supply with the measuring tool and the communications tool.



3. How to conduct inspection and adjustment

- ① Turn off the switch tool's switch 1 and 2. Then, turn the switch 3 on.
- ② Check whether or not both current and voltage from the connected rated voltage power supply are set values.

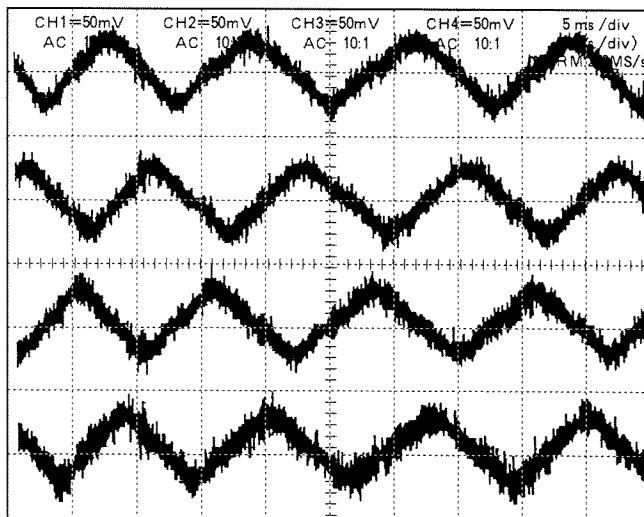
If they are to meet the set values, turn the main switch on.

- ③ Set the oscilloscope.

Then, hold the boss of the focus index unit and drive the focus ring.

- ④ Stop the waveform from the oscilloscope by 'START / STOP' key and check it.

Note : Since the shape of waveform varies according to the driving speed of focus ring, particularly and properly set Time / Div.



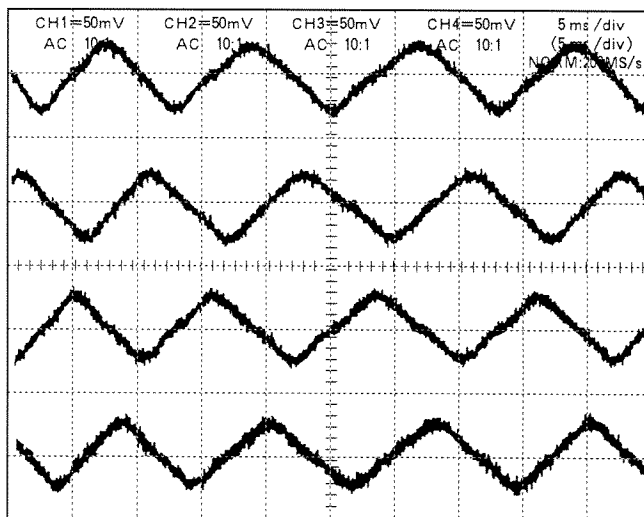
● Setting of oscilloscope

V/Div (CH1)	: 50 mV
V/Div (CH2)	: 50 mV
V/Div (CH3)	: 50 mV
V/Div (CH4)	: 50 mV
Coupling	: AC
Time/Div	: 5 ms (reference)

- ⑤ In the case of detecting any wider waveform noise, use the filter function.

How to set the filter function in the employment case of Yokogawa-manufactured DL1540

1. Press the filter button.
2. Select 'Smooth' in the menu on PC screen.



amplitude

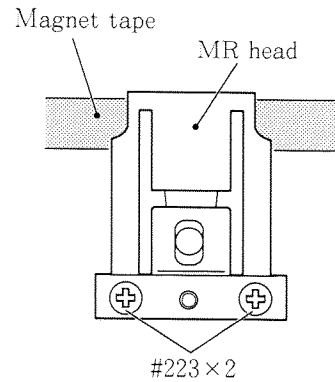
Criteria : The amplitude of every pulse / waveform should be more than 40 mV.

Precaution : Check the waveform by letting the focus ring to travel from the infinity-end position to the nearest distance and vice versa.



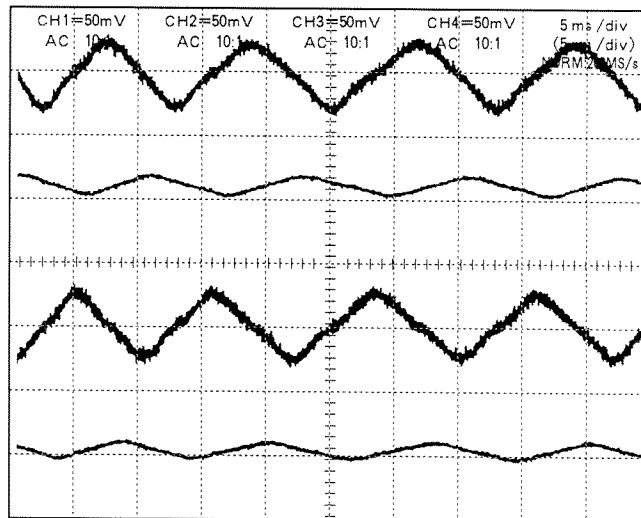
- ⑥ In the case of smaller amplitude, for adjustment, loosen two pieces of the screw #223 and then shift the MR head position as shown in the right figure.

Precaution : Due to a cause to damage the magnetic data, during adjustment, avoid that the magnet tape and the MR head touch the magnetism-maintained driver bit.

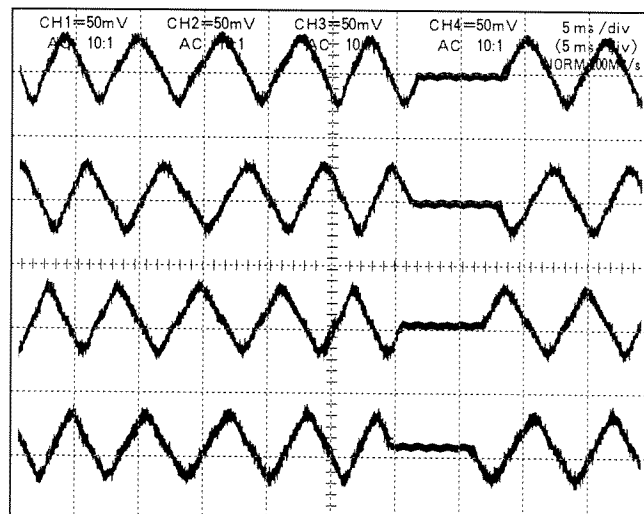


《Reference》

- In case the amplitude of either 'CH 1 and 3 phases' or 'CH 2 and 4 phases' combination seems smaller, either of the two screws may loosen. Then, check the screws.
- Or, in case the both screws are enough tightened, the MR head may be troubled. Then, be sure to replace the MR head unit B19 and adjust it again.



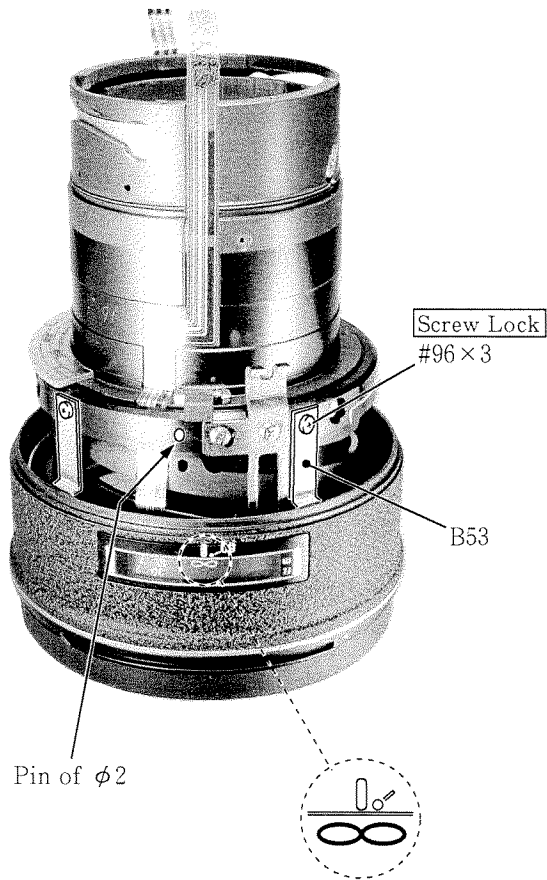
- In case of a presence of partial drop in the amplitude between the infinity and the closest distance, the magnetic data in magnetic tape may be damaged. Then, replace the magnetic tape and adjust it again.



- ⑦ Turn the rated voltage power supply off.

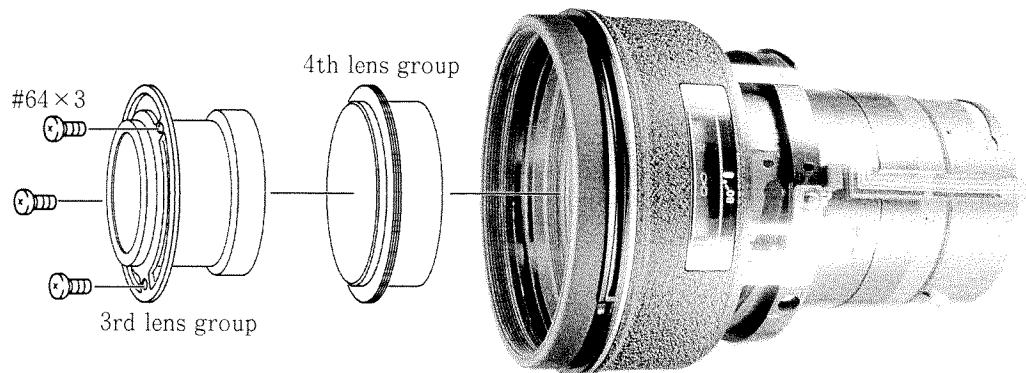


ADJUSTMENT OF FOCUS INDEX POSITION

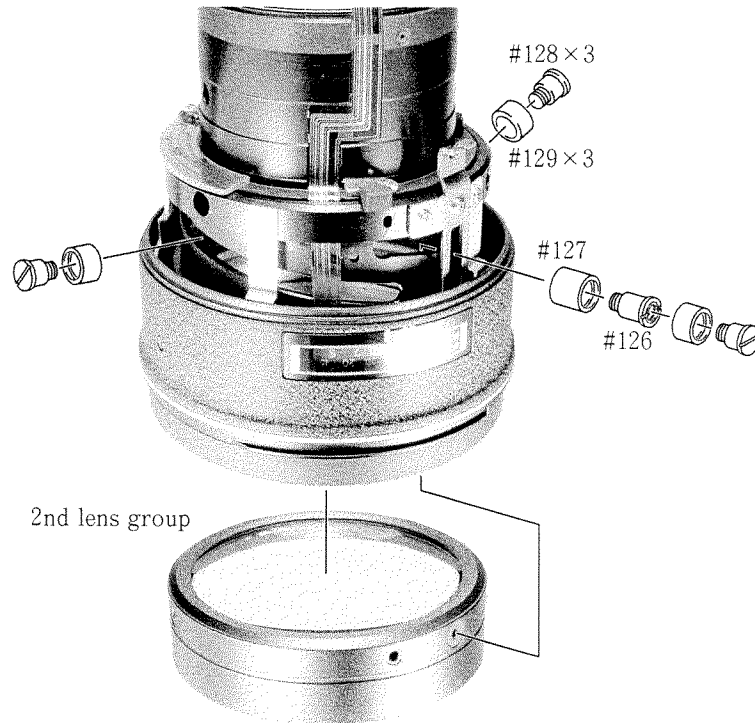


- ① Using a drill or so, insert the pin of $\phi 2$ at the position designated in the left photo.
- ② Loosen 3 pieces of the screw #96.
Then, shift the B53 and align both the index and the infinity mark.
- ③ Loosen 3 pieces of the screw #96 and then fix the screws by the Screw Lock.

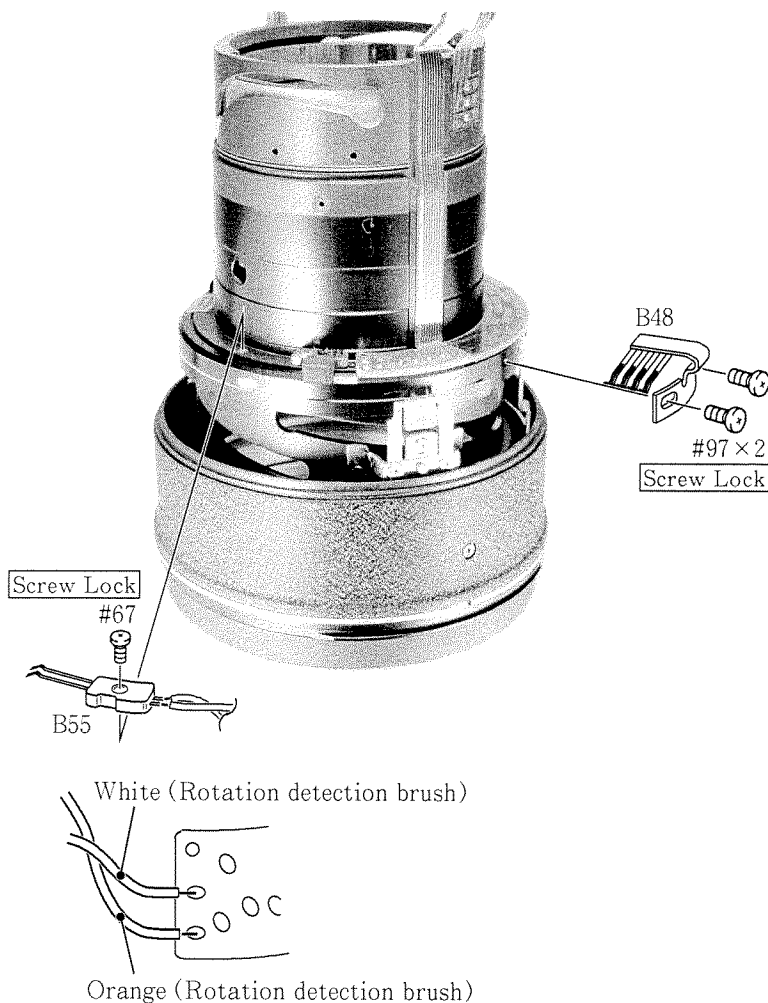
3rd, 4th LENS GROUP



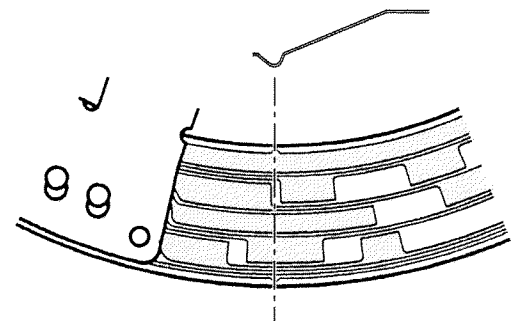
2nd LENS GROUP



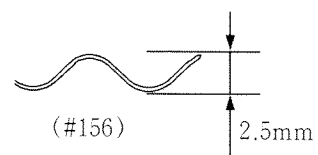
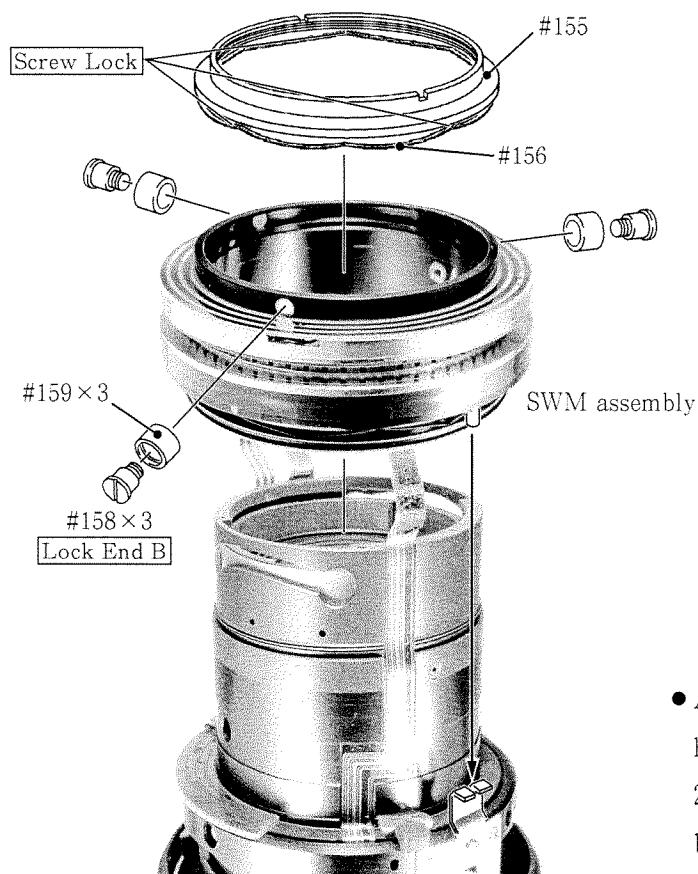
ROTATION DETECTION BRUSH, DISTANCE ENCODER BRUSH



- ① Insert the pin of $\phi 2$ on the infinity position.
For more details, refer to the page L11.
- ② Attach the distance information encoder brush B48.
Then, fix the screw tentatively.
- ③ Set the brush point to the position where contacts the line as shown in the figure below.
- ④ Loosen 2 pieces of the screw #97 and then fix the screws by the Screw Lock.



SWM ASSEMBLY



- As shown in the figure above, adjust the height of wave peak up to approximately 2.5 mm by pressing the wave washer #156 by hand(s) from the top. Then, mount it and fix them together.

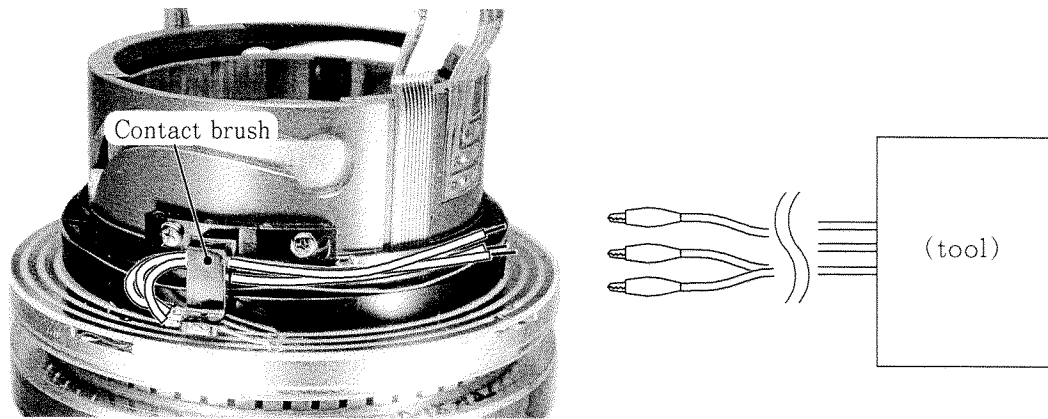
CONTACT BRUSH



CHECK THE SWM ASSEMBLY

Using the hand-made tool for SWM's rotative motion which is described in the page T2 in the repair manual for JAA 33351, check the SWM's operation mode.

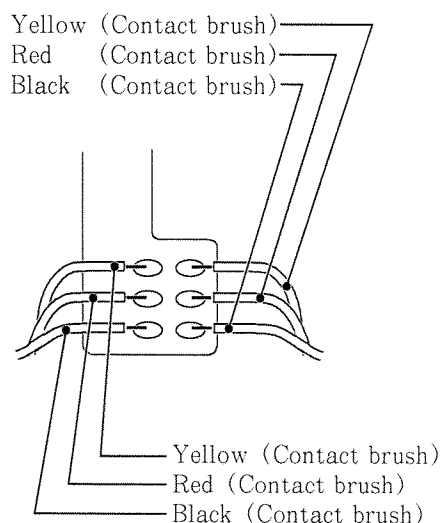
- ① Connect the hand-made tool with the contact brush.



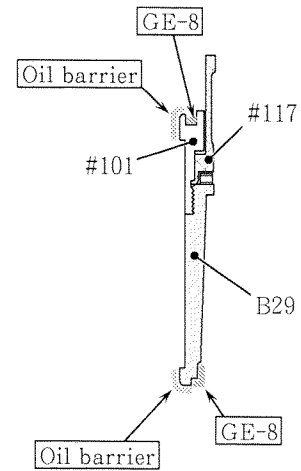
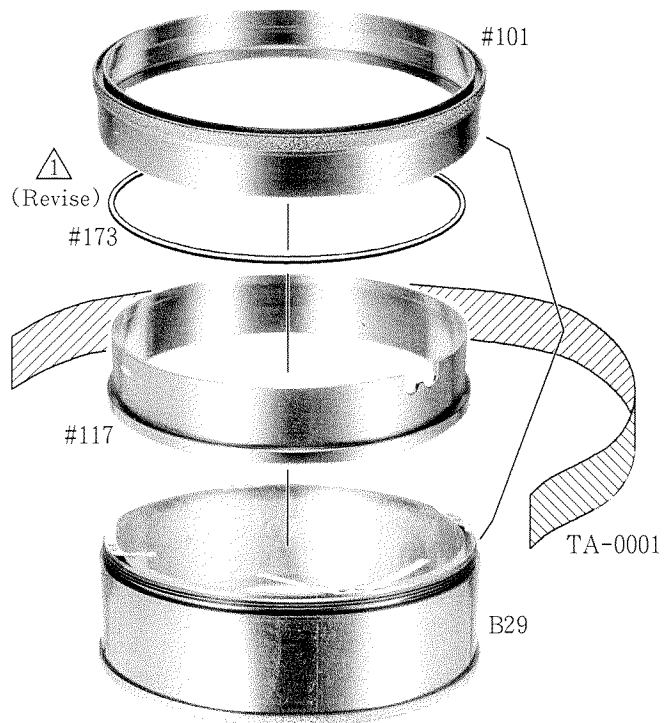
- ② Turn on the switch in order to rotate the SWM.
Let it drive until its limit, and then reverse it.
- ③ Alter the SWM's rotation speed by a variable resistance, and then check whether there is any irregular operation mode or not.
- ④ Just in case of discovery of any malfunction, remove the retaining ring #155 and then adjust the height of peak of wave washer #156 by pressing the peak by hand(s) from the top.
For more details, refer to the page L13.
- ⑤ After adjustment, fix the retaining ring #155 by the Screw Lock.



- ⑥ Solder each brush's lead wire on to the FPC.

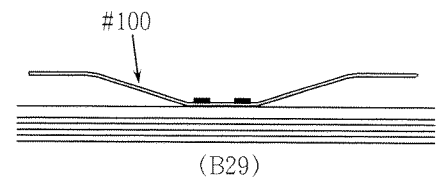


FOCUS RING GROUP, COUPLING KEY #109

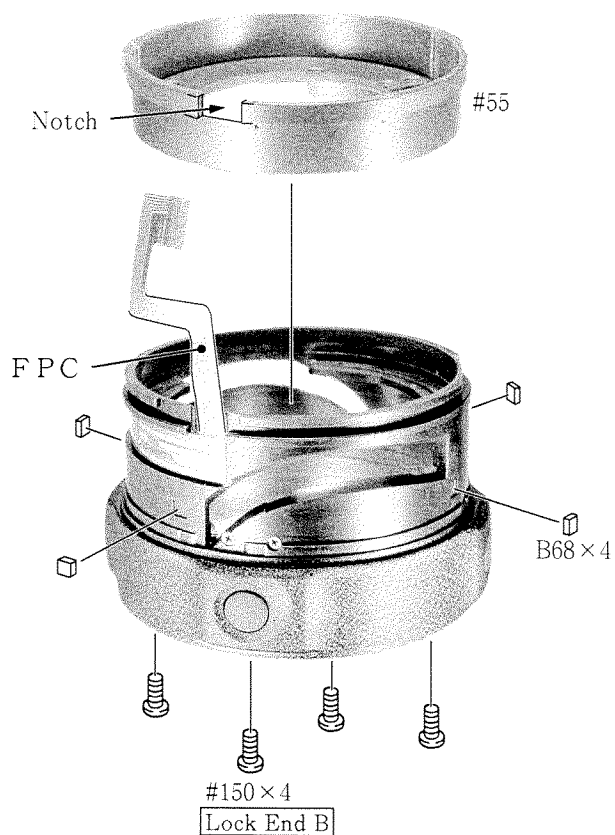
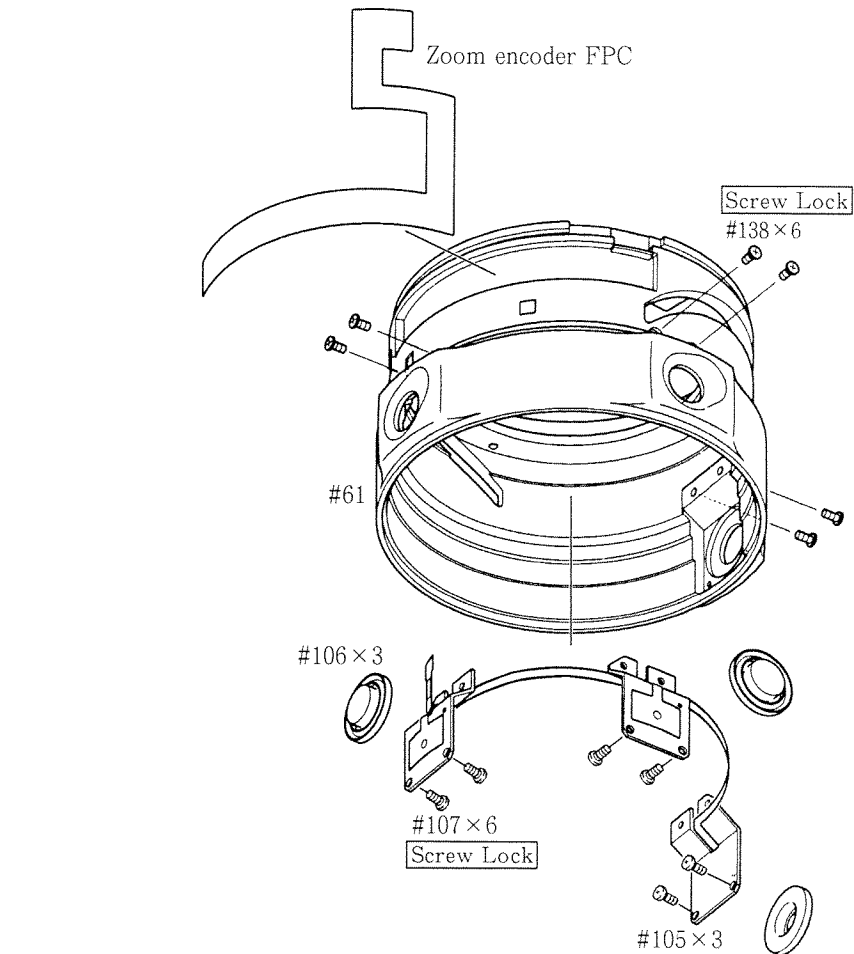


Note : Be sure that when mounting and rotating the focus ring, the focus index should follow the motion the focus ring makes, and as soon as the focus index touches the limit, the focus ring alone should rotate.

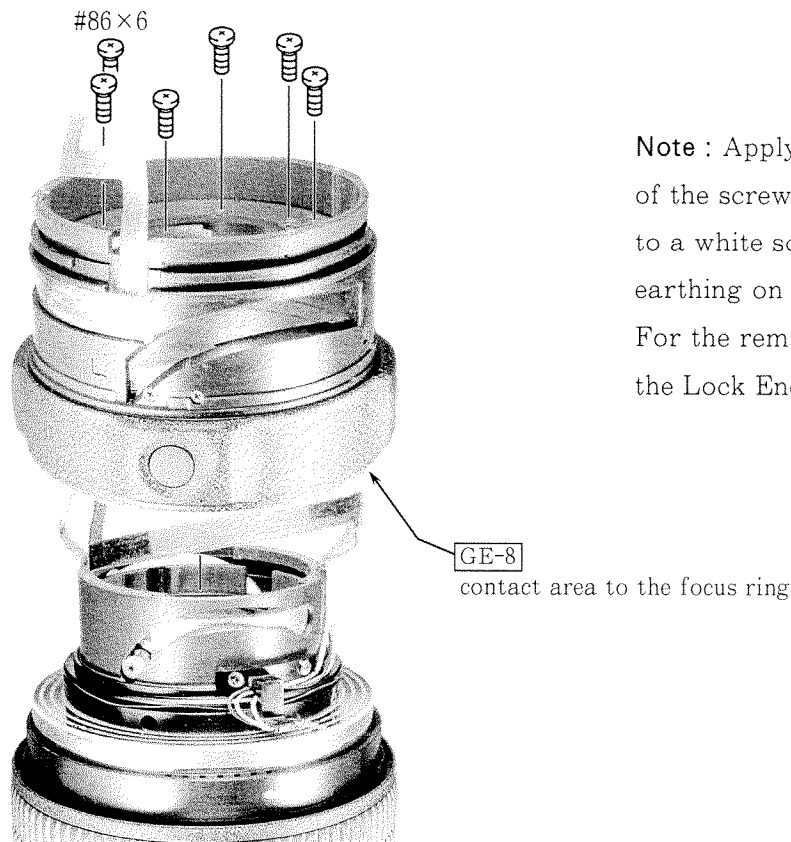
Just in any irregular rotation case, in order of adjustment, alter the angle that spring #100 makes.



AF LOCK RING GROUP

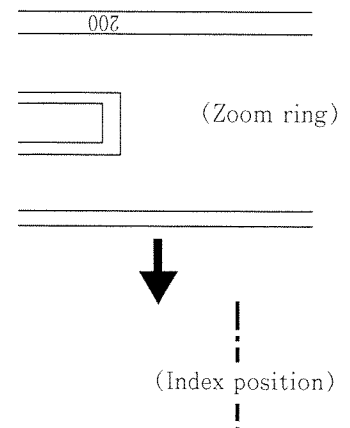
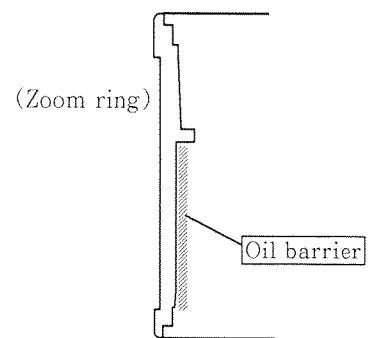


- Align the FPC and #55's notch and fix them together.



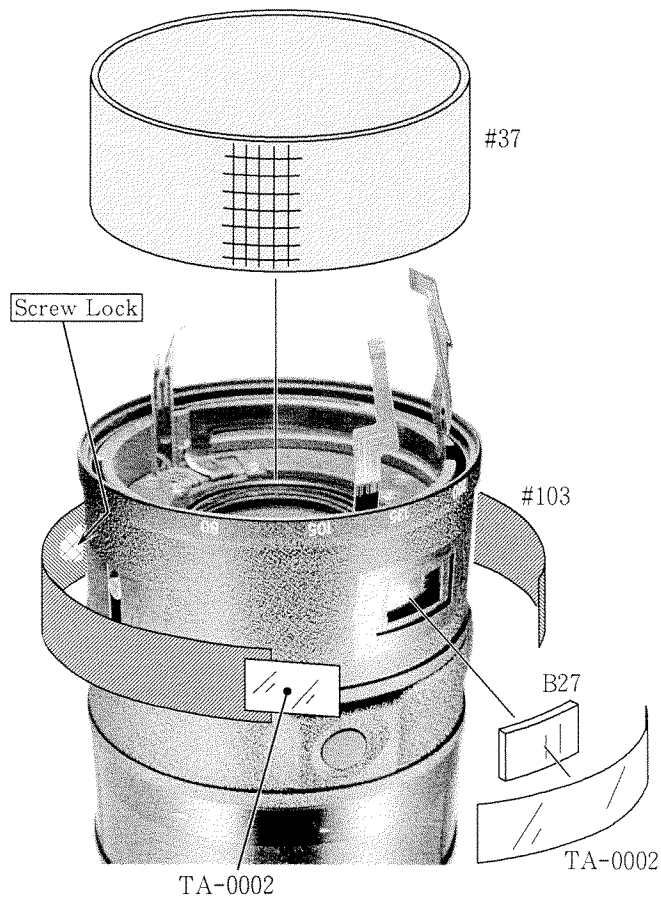
Note : Apply the Screw Lock to one piece of the screw #86 which is used for fixing to a white screw hole for the sake of earthing on the main lens body.
For the remaining five screws #150, apply the Lock End B to them.

ZOOM RING

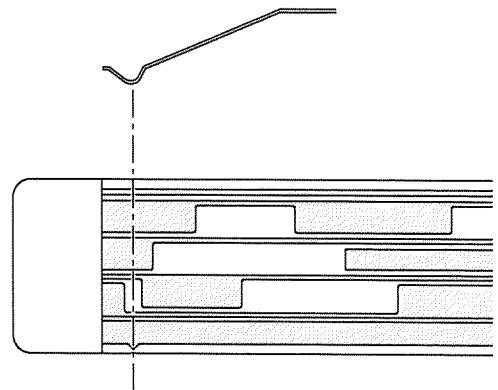


- Mount and fix the zoom ring in the position as shown in the right figure.

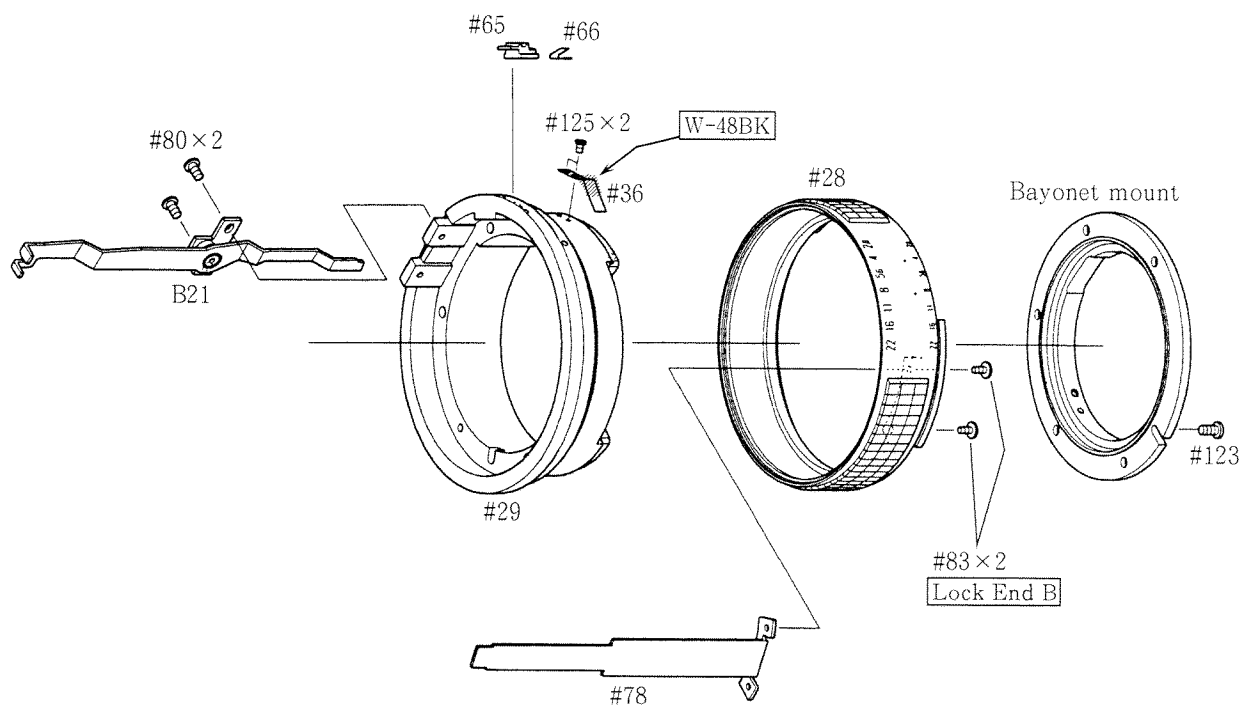
ADJUSTMENT OF ZOOM ENCODER BRUSH POSITION

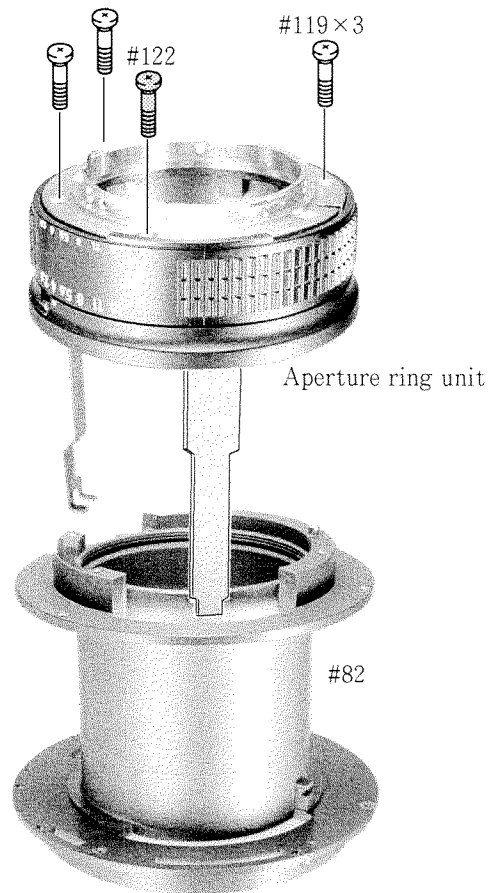


- ① Set the zoom ring to touch the limit on Tele side.
- ② In order to set the brush tip to contact the line as shown in the figure below, attach B27 by a tape TA-0002.
- ③ Wrap a sheet #103 around the zoom ring, and fix it by applying a tape TA-0002.
- ④ Put the rubber ring #37 on it.



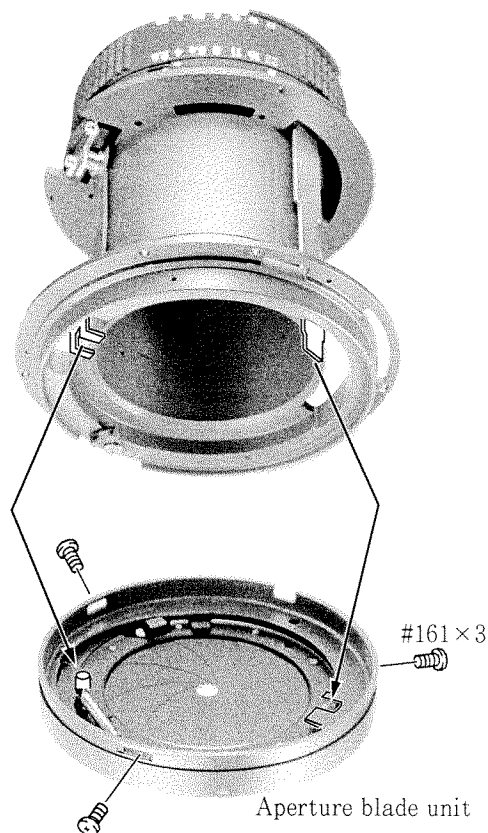
APERTURE RING, BAYONET MOUNT GROUP





- Mount the aperture ring unit on #82 and fix them together.
Then, tentatively fix one screw #122 and three screws #119.

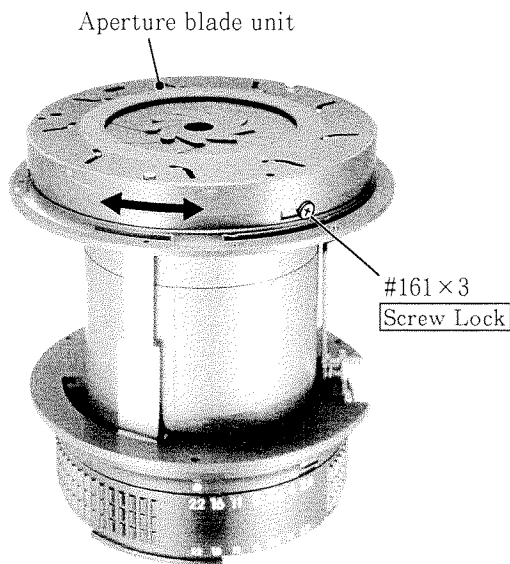
APERTURE BLADE UNIT



- After mounting and fixing, operate the aperture ring and the aperture lever and check whether the aperture blade can interlock or not.

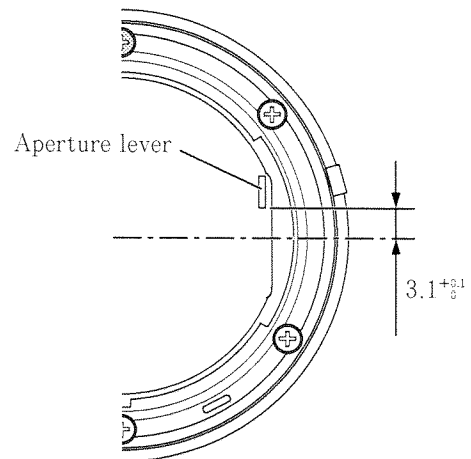
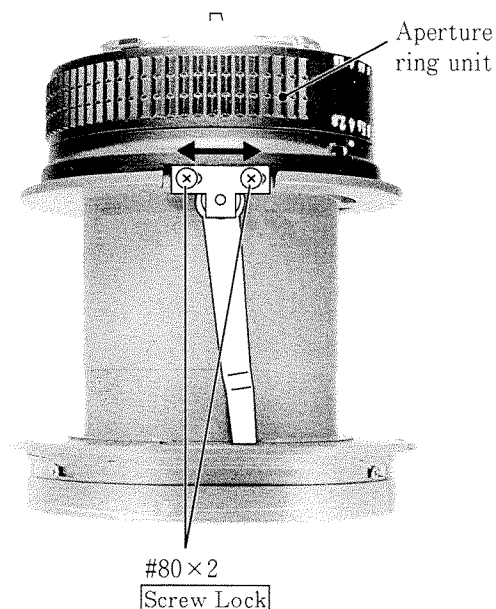
APERTURE DIAMETER ADJUSTMENT

- ① Adjust the diameter by loosening the screws #161×3 and moving the aperture blade. As a standard, set the maximum aperture ($f/2.8$) the same as the inside diameter of the arrow rack #33. (The inside diameter of the arrow #33 is almost the same as the reference inscribed circle diameter.)
 - The aperture diameter must be within the allowable range even if moving the aperture ring back and forth.
 - The aperture diameter must be within the allowable range when the aperture lever is flipped by the finger and when it is not so.
- ② After adjustment, fix the screws #161×3 with screw lock.



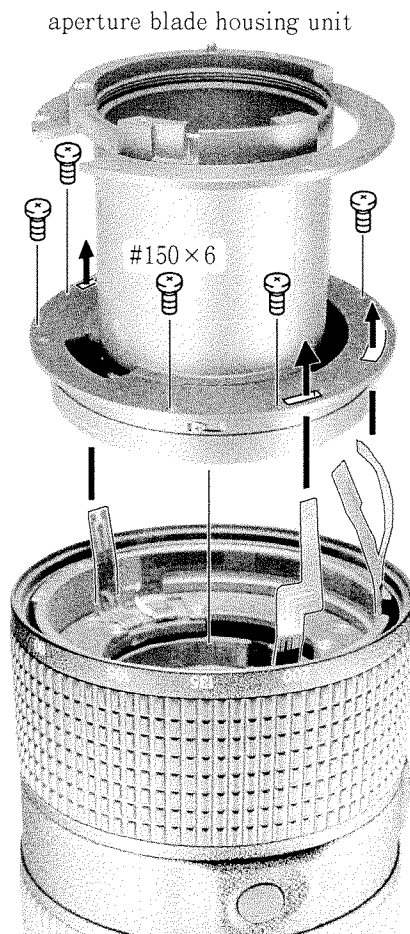
Aperture setting	Inscribed circle diameter (mm)	Allowable range (mm)
2.8	38.40	40.94 ~ 36.89
4	27.54	29.74 ~ 25.50
5.6	19.40	21.78 ~ 17.29
8	13.63	15.30 ~ 12.15
11	9.68	11.29 ~ 8.30
16	6.84	7.98 ~ 5.87
22	4.89	5.59 ~ 4.11

APERTURE LEVER POSITION ADJUSTMENT



Adjust the position by loosening the screws #80×2. The aperture lever position must be within $3.1^{+0.1}_{-0}$ to obtain the proper maximum aperture diameter. After adjustment, fix 2 pieces of the screw #80 by the Screw Lock and then remove the aperture ring unit.

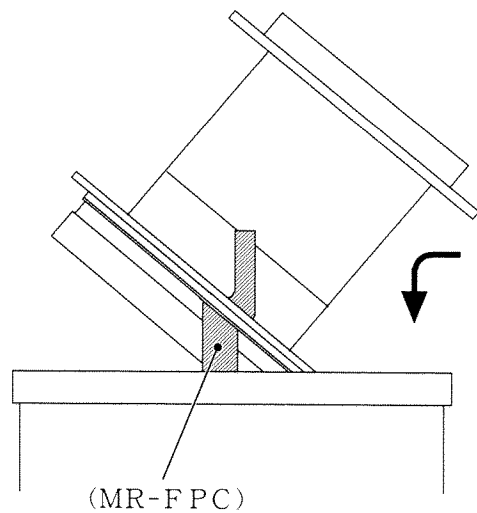
HOW TO FIX THE APERTURE BLADE HOUSING UNIT



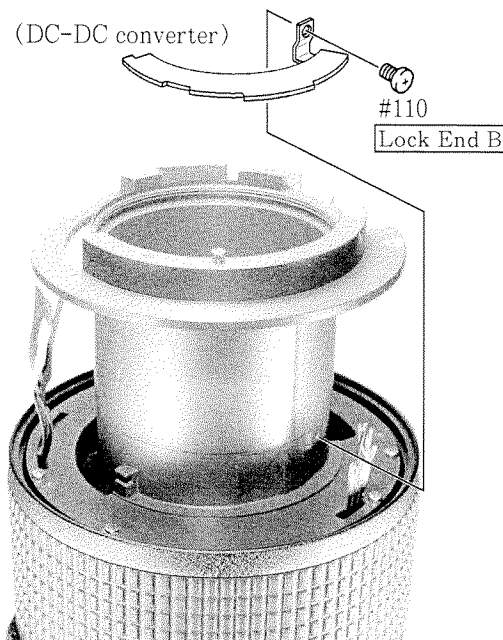
Note : For mounting and fixing the aperture blade housing unit, as instructed in the figure below, avoid to cut off the MR-FPC.

Then, apply the Screw Lock to one piece of the screw #150 which is used for fixing to a white screw hole for the sake of earthing on the main lens body.

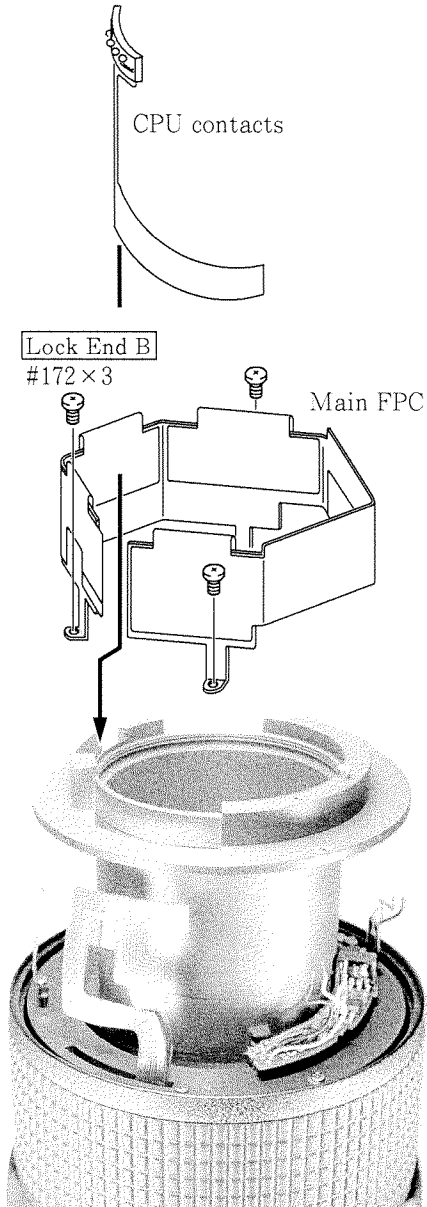
For the remaining five screws #150, apply the Lock End B to them.



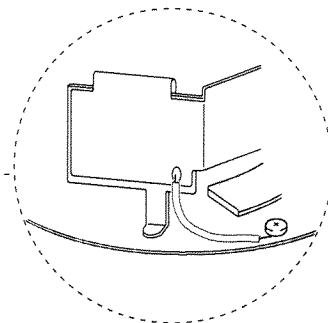
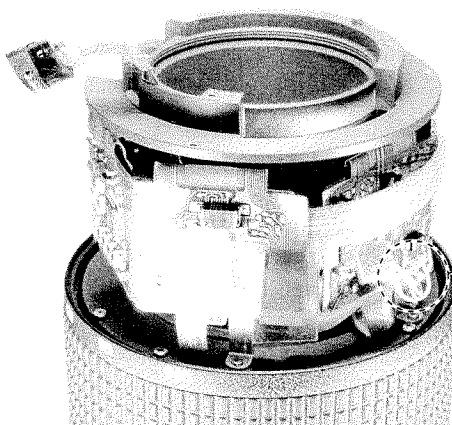
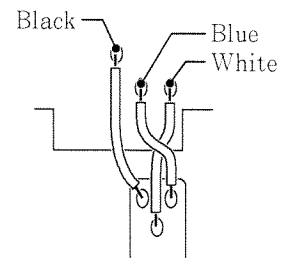
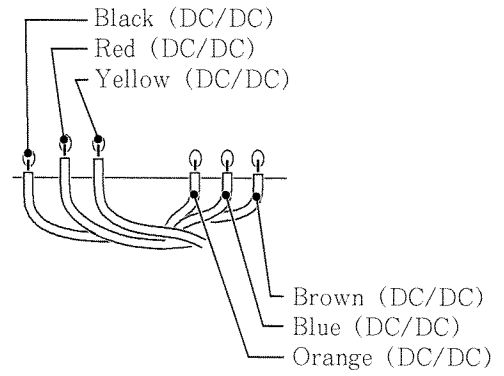
DC-DC CONVERTER



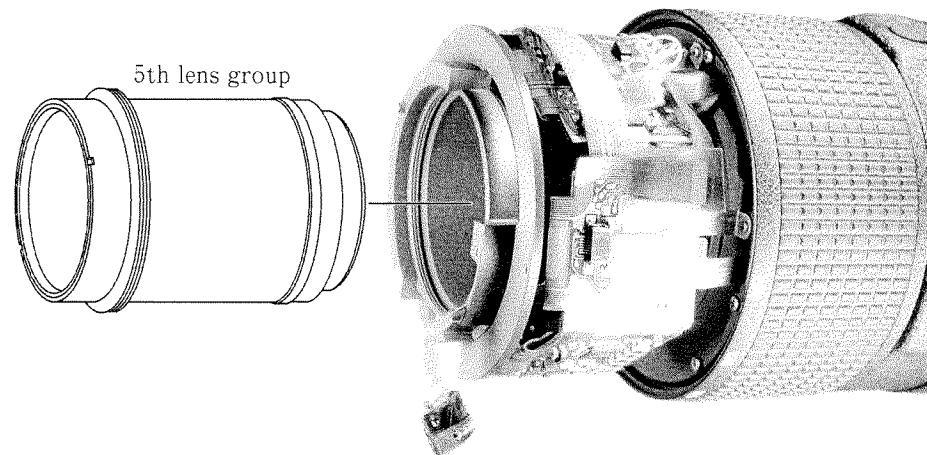
MAIN FPC



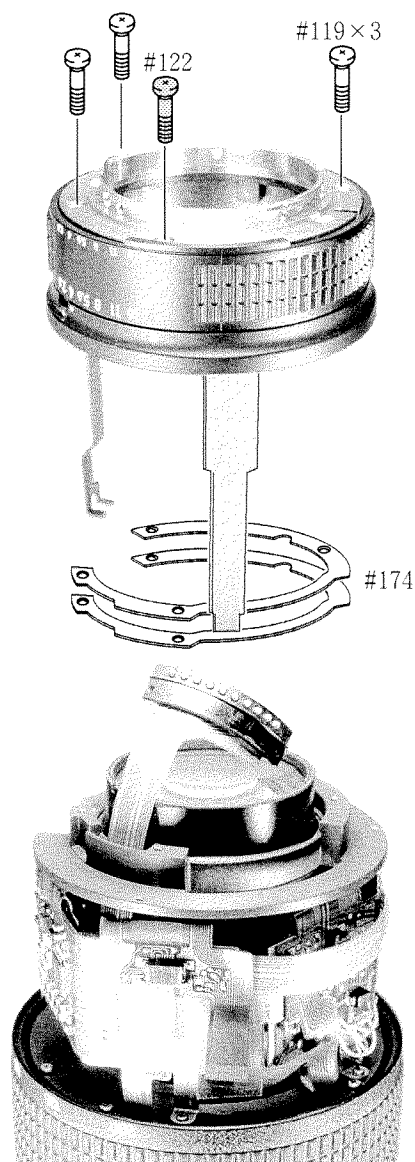
- Connect four connectors and solder each wire as shown below.



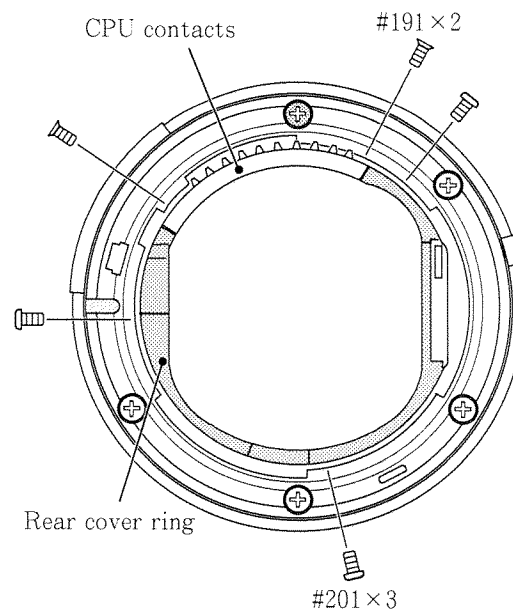
5th LENS GROUP



APERTURE RING UNIT



REAR COVER RING



PREPARATION FOR ADJUSTMENT OF THE MAIN FPC

- In case of replacing the main FPC, SWM unit or MR encoder unit, be sure to adjust the following items due to a necessity on the operation.

1. Items to adjust

- Pulse from the MR encoder
- Scanning speed checked from the driving frequency
- Oscillation circuit

2. Necessary equipment

- Single output rated voltage power supply : 1 to 3 unit(s)

For contact A to mount : 5.0 to 5.5 V 100 mA

For contact F to contact G : 6.0 V 3.0 A

In case of utilizing double output power supplies : 5.0 V 2.0 A

- Multiple output rated voltage power supply : 1 unit for H8 D/A converter (for F/V converter)

In case of using the double output power sources : $\pm 15.0\text{ V}$ 300 mA

In case of using the triple output power sources : $\pm 15.0\text{ V}$ 300 mA

 $+ 5.0 \text{ V} \quad 2.0 \text{ A}$

- H8 D/A converter J15334 (as F/V converter) : 1 unit for adjusting the scanning speed
- Oscilloscope : 1 unit for adjusting the pulse from the MR encoder, and for adjusting the scanning speed
- Frequency counter : 1 unit for adjusting the scanning speed, and for adjusting the oscillation circuit
- Communications tool J15353
- Switching tool J15355

⟨For your reference⟩

Only 1 unit of the single output rated voltage power source is possible to supply current from the power source needed for adjustment.

Then, its voltage value should be fixed to 5.0 V.

Note : In case of the presence of any defective conduction mode between the communications tool and the main FPC, corrosion or oxidation mode on the main FPC contact surface shall be conceivable.

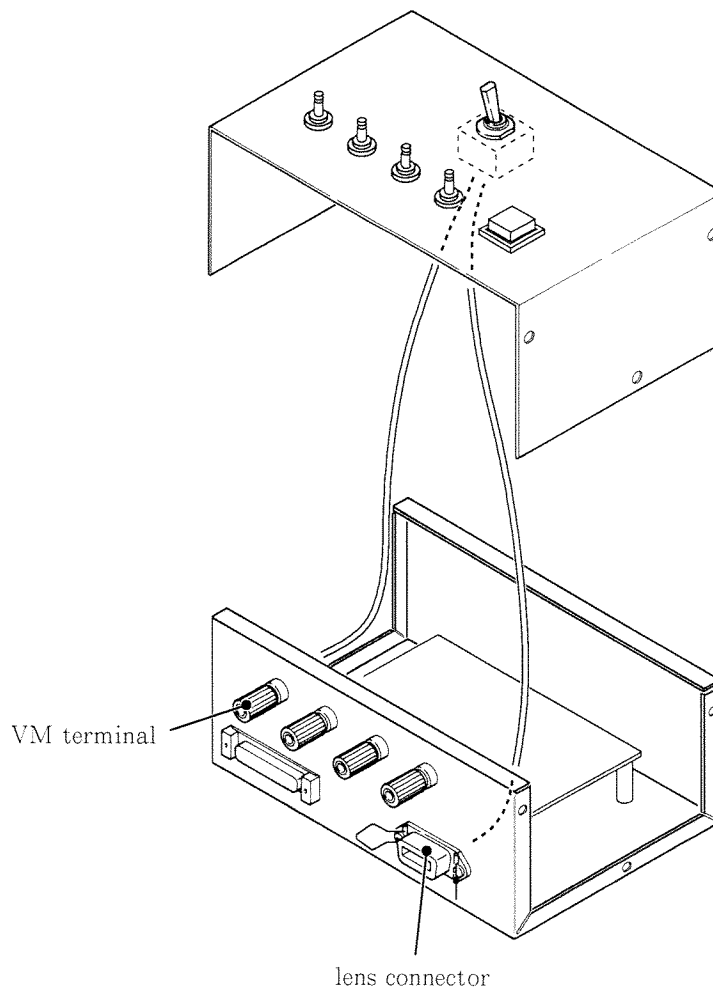
Then, polish the contact surface and connect.

3. Preparation of the measuring lens

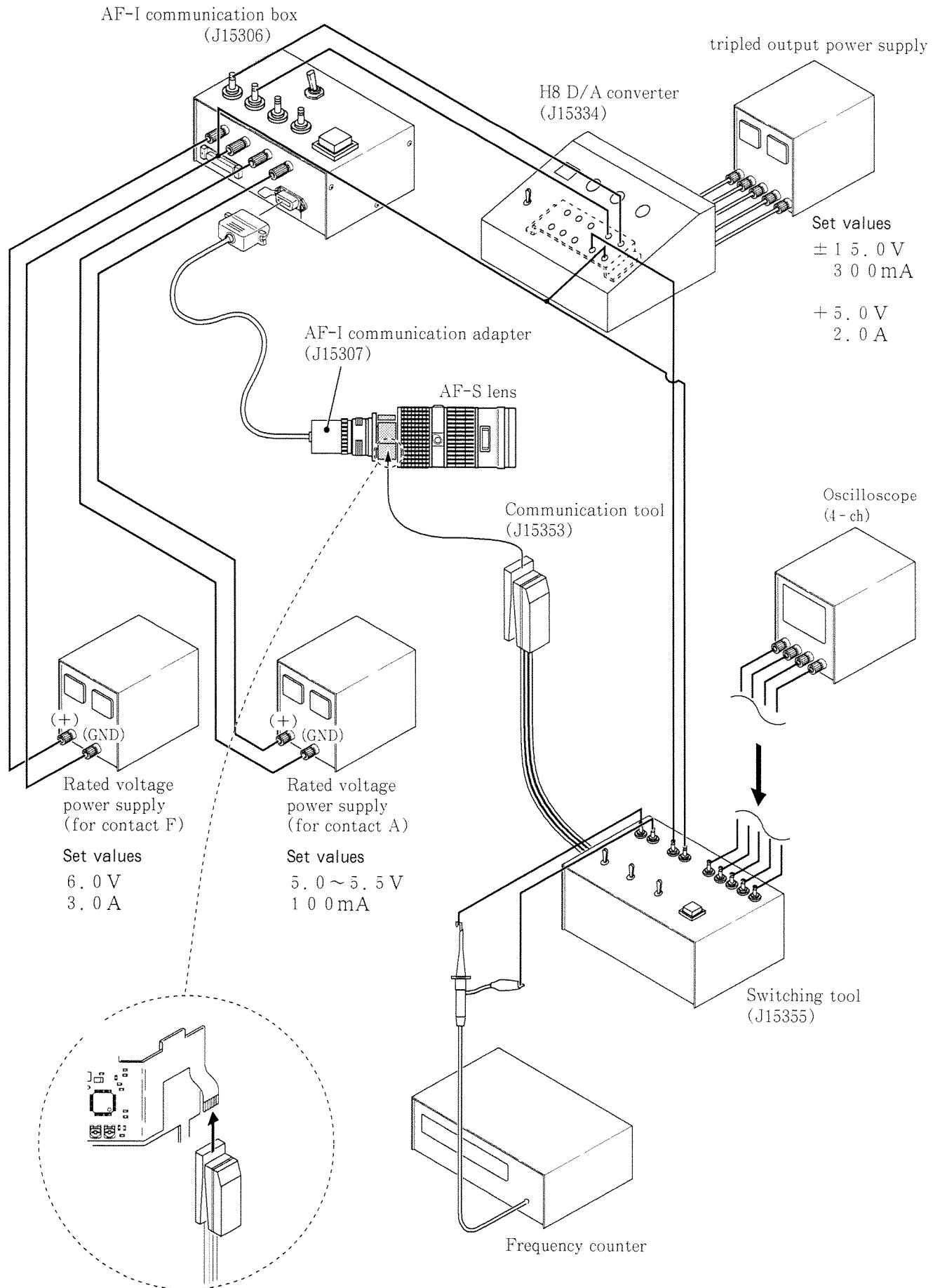
- As shown in the figure in the next page, arrange the connections between the rated voltage power supply, the measuring tools and the communication tool.
- As shown in the figure in the page L 39, arrange the connections with the AF-S lens inspection system.

In case the DC-DC converter is already connected in the AF-I communications box, the rated voltage power supply for contact A is not necessary.

- In case of measuring the AF-S zoom lens, the AF-I communications box needs to be remodeled as shown in the figure below.



- Connect the toggle switch with the somewhere between the VM terminal and the 1 pin, or the contact F, on lens connector.
Then, perform wiring.
- In order to set the lens driving mode selector switch to M/A, do not short both white and orange lead wires which are to be soldered at the change-over switch.

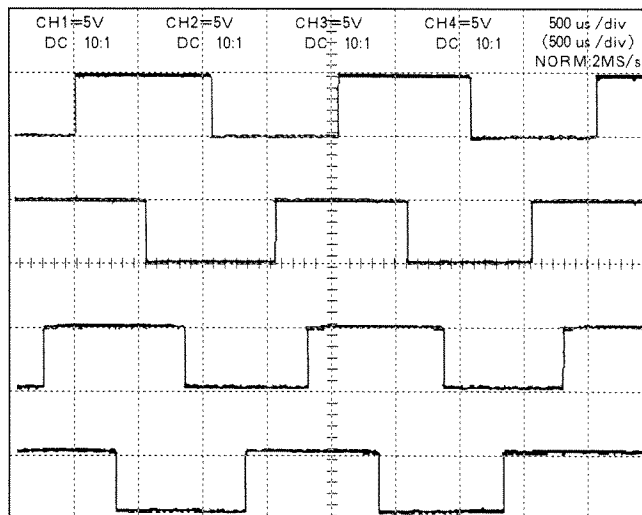


PULSE ADJUSTMENT FOR THE MR ENCODER


- In case of replacing the MR encoder, be sure to adjust the pulse.

How to adjust

- ① On the switching tool, turn on the switch 1, turn off the switch 2, and turn on the switch 3.
- ② Check whether the arranged numerical value for connecting each current and voltage is adequate or not.
Then, turn on the rated voltage power supply each for the contact A and the contact F.
- ③ Select the item of "The main FPC adjustment" from the menu in the AF-S zoom lens inspection program.
Then, set the mode ready for the adjustment.
- ④ Turn on the remodeled switch on the AF-I communications box.
Then, the lens automatically starts the scanning operation.
- ⑤ Stop the pulse from the oscilloscope by operating 'START / STOP' key.
Then, the quantity of width between H and L should be two to three blocks.

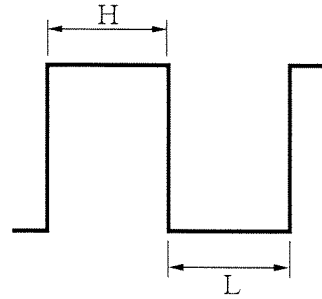
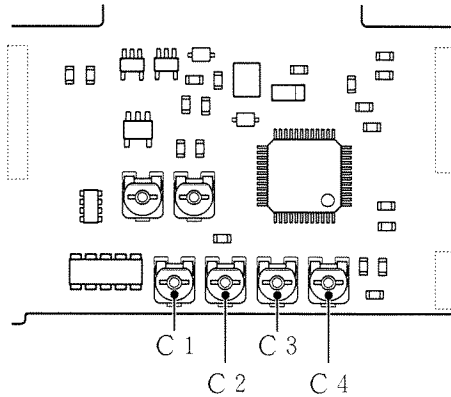


● Setting of oscilloscope

V/Div (CH 1) : 5 V
 V/Div (CH 2) : 5 V
 V/Div (CH 3) : 5 V
 V/Div (CH 4) : 5 V
 Coupling : DC
 Time/Div : 500 μ sec
 Trigger Mode : AUTO
 Trigger Coupling : DC
 Trigger Source : CH 1
 Trigger position : - 4 div
 Trigger Type : 
 Trigger Level : 2.5 V

- ⑥ Adjust the ratio between H and L in each CH 1 to CH 4 by VR, variable resistor.

Standard $H : L = 9 : 10 \sim 10 : 9$



CH 1 : VR for C 1

to

CH 4 : VR for C 4

In the case of longer H : Drive the VR clockwise.

In the case of longer L : Drive the VR anticlockwise.

Note : In the impossible case of adjusting it by the VR, replace the MR encoder unit.

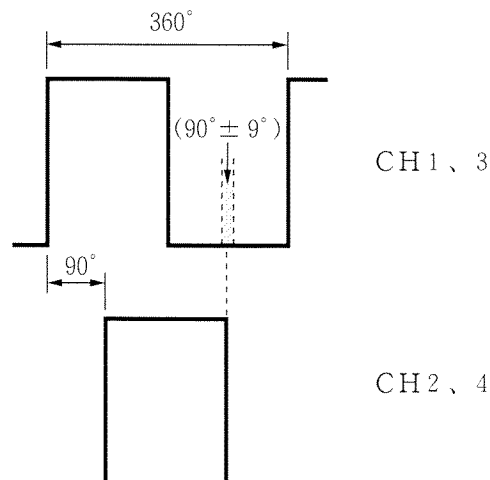
- ⑦ After adjusting the width ratio between H and L, as shown in the figure below, check that CH 1 goes horizontally 90-degree earlier than CH2.

Besides, confirm that this phenomenon also applies for the case between CH 3 and CH 4.

Standard within $90^\circ \pm 9^\circ$

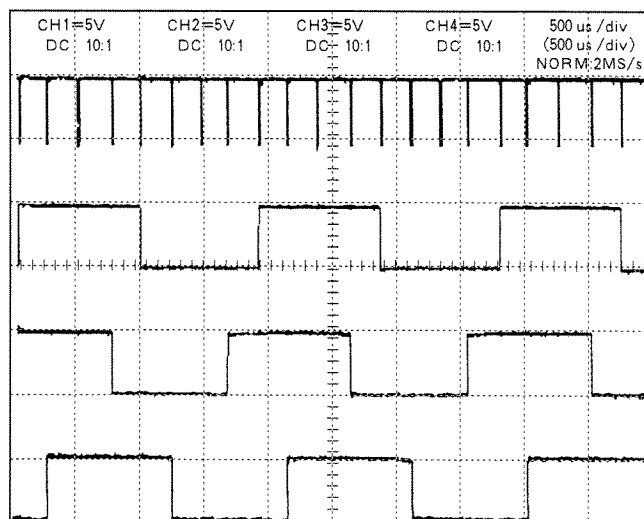
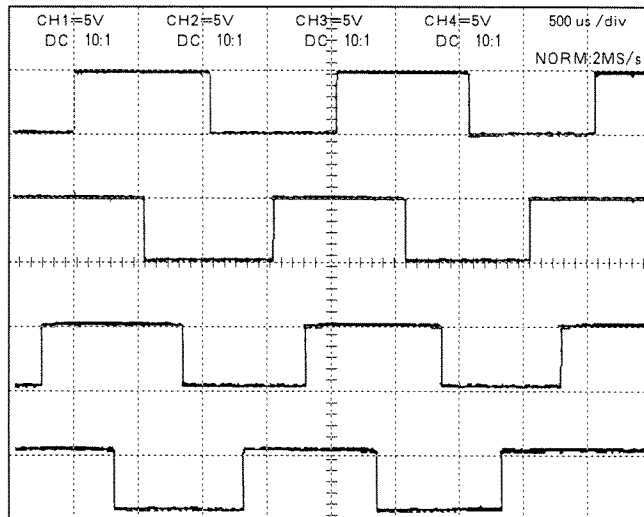
Note : In case the focus index ring drives from the closest position to the infinity, the CH 2 and 4 horizontally advance in 90° against the CH 1 and 3.

Besides, just in the out-of-standard case, replace the MR encoder unit.



⑧ Press the switch 4 of switching tool.

⑨ Stop the oscilloscope CH1's pulse by operating the 'START / STOP' key and then check there are equal intervals among them.



● Setting of oscilloscope

Change only the Trigger Mode to SGL[S].

⑩ Turn off the remodeled switch on the AF-I communications box.

Then, escape from the adjustment-available mode in the AF-S zoom lens inspection program.

⑪ Turn off the arranged voltage power supply.

ADJUSTMENT FOR SCANNING SPEED/INSPECTION FOR DRIVING FREQUENCY

- This adjustment is made for calculating the adjusted frequency value for the oscillation circuit adjustment.

In this accord, be sure to adjust it when replacing either the main FPC, the SWM, and the MR encoder unit.

- ① For how to connect the rated voltage power supply with the measuring tools, follow the same procedures with 'Pulse adjustment for the MR encoder'.

① (Revise)

- ② Check whether or not both current and voltage from the rated voltage power supply are the same with the set values.

- ③ Set the switch of the H8 D/A converter in accordance with the conditions below, and then turn on the triple output power source.

Rotary switch : Frequency, UP, 10 KHz, 20 m sec., 2K

Toggle switch : Open

INA : Connect INA with the terminal H on AF-I communications box.

INB : Connect INB with the terminal E on AF-I communications box.

GND : Connect GND with both the AF-I communications box' terminal GND and the switching tool's terminal GND.

D/A : Connect the D/A with the terminal ~~4~~ on switching tool.

D/A ② (Revise)

- ④ On the switching tool, turn on the switch 1 and turn off the switch 2 and 3.

- ⑤ Turn on the arranged voltage power supply for the contact A and the contact F.

Note : In case the ampere meter index widely swings, immediately turn off the power supply.

This mode shows the dangerous and critical condition caused by the circuit in short condition.

- ⑥ Select the item of 'Main FPC adjustment' in the AF-S zoom lens inspection program menu.


Then, set the mode ready for adjustment.

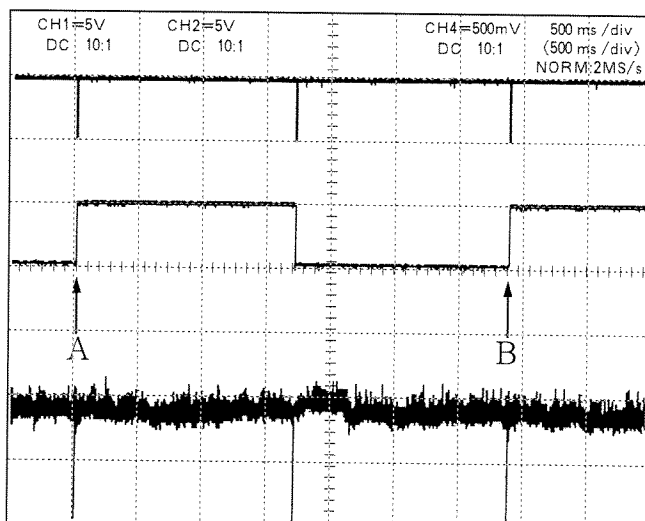
- ⑦ Turn on the remodeled switch on the AF-I communications box.

Then, the lens automatically starts the scanning operation.

- ⑧ Using the oscilloscope, measure both the scanning time CH2 and D/A output CH4 from the H8 D/A converter.

● Setting of oscilloscope

V/Div (CH 1) : 5 V
V/Div (CH 2) : 5 V
V/Div (CH 3) : OFF
V/Div (CH 4) : 500 mV
Coupling : DC
Time/Div : 500 m sec
Trigger Mode : NORMAL
Trigger Coupling : DC
Trigger Source : CH 1
Trigger position : - 4 div
Trigger Type : 
Trigger Level : 2.5 V

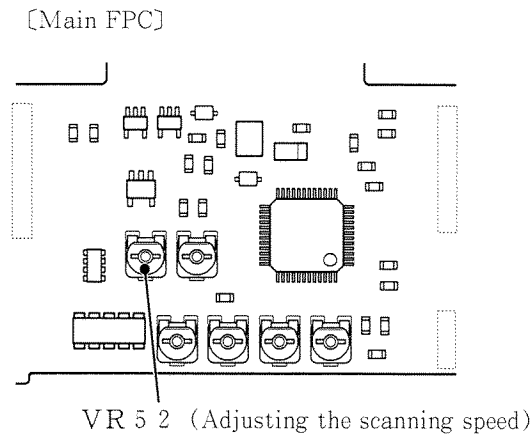


① × 1

② × 1 Change page

- ⑨ Using the VR 52, adjust the scanning speed which is created between the pulse A and B in the oscilloscope CH2.

The numerical value of scanning speed : $3.5 \pm 0.3 \text{ sec} (10 \pm 1 \text{ rpm})$



- ⑩ Check whether there is any irregular scanning mode in the oscilloscope CH4's pulse or not.

The pulse to be checked : Whole pulse except the one(s) dropping around to 0 V.

Referable value : The difference between max. and min. should be less than 1 V.

Note : In case of any conspicuous difference(s) among the pulses, there is a possibility of any mechanical failure in the MR encoder unit.

- ⑪ After adjusting the scanning speed, take a record of the driving frequency which is a measured value on the frequency counter.

In case there is a HOLD function on the frequency counter, to hold the displayed measured value shall be recommendable for your further convenience.

- ⑫ After turning off the remodeled switch in the AF-I communications box, escape from the adjustment-available mode in the AF-S zoom lens inspection program.

- ⑬ Turn off the switch 1 on switching tool.

- ⑭ Select the item of "Check for driving frequency" from the AF-S zoom lens inspection program menu.

- ⑮ Follow the instructions on PC screen and check the temperature coefficient.

Then, input the driving frequency value which was recorded in the column above.

Accordingly, both the high and low frequency values from the adjusted frequency range are displayed.

Note : While displaying the inspection program, adjust the oscillation circuit.

- ⑯ Turn off the triple output power supply of the H8 D/A converter.

ADJUSTMENT FOR THE OSCILLATION CIRCUIT
--

- This adjustment is made for the frequency which drives the SWM.

Be sure to perform after adjusting the scanning speed.

Note : Continuously adjust the oscillation circuit after adjusting the scanning speed.

① For how to connect the rated voltage power supply with the measuring tools, follow the same procedures with 'Adjustment for scanning speed'.

② On the switching tool, turn off the switch 1, turn on the switch 2 and turn off the switch 3.

③ Check whether each current and voltage value from the connecting voltage power supply is set-up value or not.

Then, turn on the rated voltage power supply for the contact A and the contact F.

Note : In case the ampere meter index widely swings, immediately turn off the power supply.

This mode shows the risky and critical condition caused by the circuit in short condition.

④ Turn on the remodeled switch in the AF-I communications box.

⑤ For checking the driving frequency, select the item of "2. Adjustment of oscillation circuit" in the displayed adjusted frequency value on PC screen, and then set the mode ready for adjustment.

⑥ Check whether the displayed value on the frequency counter is around 124 KHz or not.

Note : In any irregular value mode case on the display, reconfirm each arrangement mode for the rated voltage power supply and for each switch, and then go to the inspection mode again.

In case what is displayed still shows any irregularity even after doing the procedures above, once again try the processes from in the former page, L 32.

⑦ Turn off the switch 2 on the switching tool.

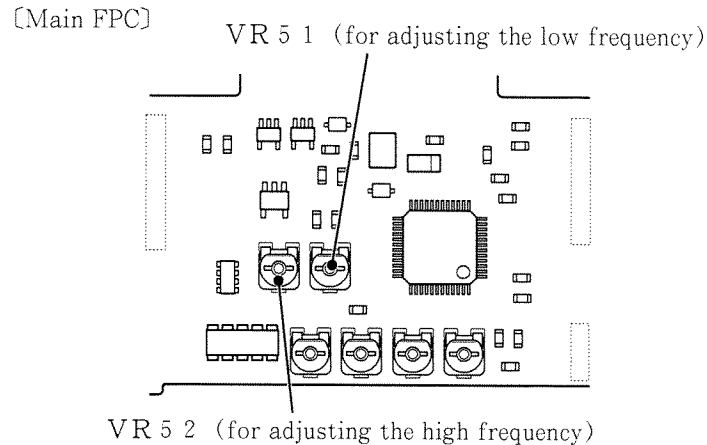
Check the displayed value on the frequency counter is around 108 KHz.

⑧ Check the both high and low frequency values from the adjusted frequency range on PC screen.

⑨ Turn on the switch 2 on the switching tool. Then, using the semi-fixed resistor VR 52, adjust the high frequency-sided frequency value.

⑩ Turn off the switch 2 on the switching tool.

Then, using the semi-fixed resistor VR 51, adjust the low frequency-sided frequency value.



⑪ Turn off the remodeled switch in the AF-I communications box.

Then, escape from the adjustment-available mode in the AF-S zoom lens inspection program.

⑫ Turn off the rated voltage power supply for the contact F and the contact A.

△ (Revise)

WRITING THE ABERRATION COMPENSATION DATA

- For the sake of improvement in auto focus accuracy, the aberration characteristics of lens is are measured and then the aberration compensation data particularly responding to the characteristics is written in each lens.

In the case of replacing the main FPC or each part for lens such as glass or lens housing / in the case of disassembling each part for lens, it is necessary to measure the aberration characteristics and then to write the aberration compensation data to EEPROM.

However, due to employment of specific device, it can not be measured in regular repair services. In this accord, through writing the fixed value, the aberration is compensated for the sake of sustaining its accuracy.

【Follow the procedures below for writing the fixed value】

① Connect everything with each other for the inspection system for AF-S lens.

It is possible to conduct adjustment as the oscillation circuit is connected for adjustment.

Then, do not use the switch tool, the H8 D/A converter and so.

② Select 'READING AND REWRITING THE EEPROM DATA' from the menu items of the inspection programme for AF-S zoom lens.

③ Write the fixed value.

ADJUSTMENT FOR MOTOR CONTROL

- In order to further optimize the SWM's initial driving, this adjustment should be conducted. Accordingly, after adjusting the oscillation circuit or / and after writing the aberration compensation data, be sure to conduct the adjustment.

Note : During adjustment, be sure to keep the lens flat.

In the case of replacing the main FPC, unless the aberration compensation data, which equals the fixed value in EEPROM, is rewritten, normal adjustment is not made possible.

In this accord, be sure to write the data prior to the regular adjustment.

- ① As shown in the page L39, connect everything with each other as the inspection system for the AF-S lens.

Although it is possible to conduct adjustment in the already arranged connection for adjusting the oscillation circuit, some of equipment such as the switch tool, the H8 D/A converter or so are not necessary then for its operation.

- ② Ensure that each set value is actually applied to both current and voltage for the rated voltage power supply.

Then, turn on the rated voltage power supply for both contacts A and F.

Note : In case the current meter's hand widely swings, due to electrically short condition in the circuit, be sure to immediately turn off the power supply.

- ③ Select 'ADJUSTMENT FOR MOTOR CONTROL' from the menu items in the inspection programme for AF-S lens, and then conduct adjustment.

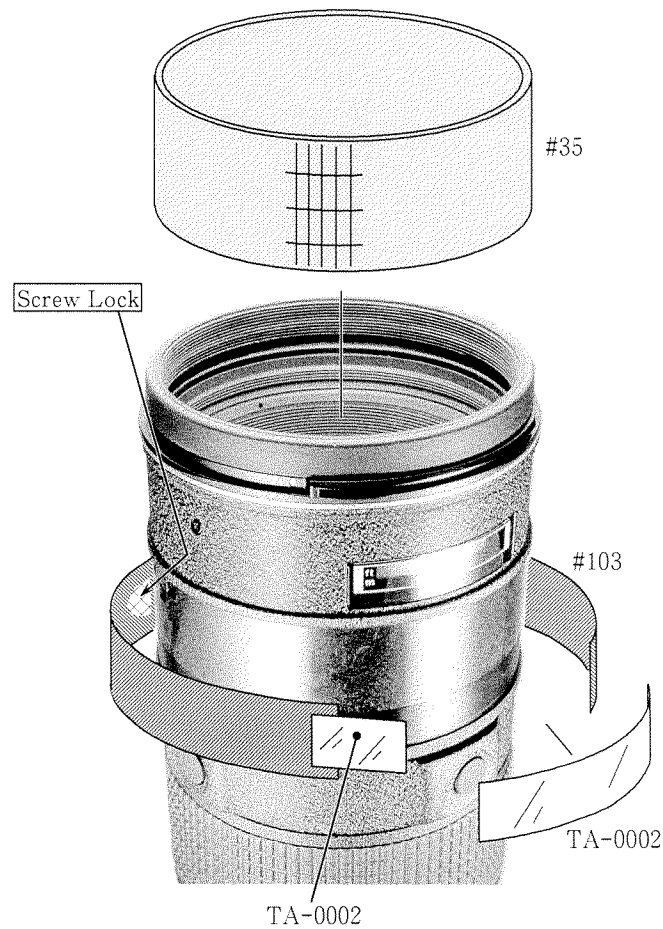
- ④ Turn off the rated voltage power supply for both contacts A and F.

HOW TO MANAGE AFTER ADJUSTING THE MAIN FPC

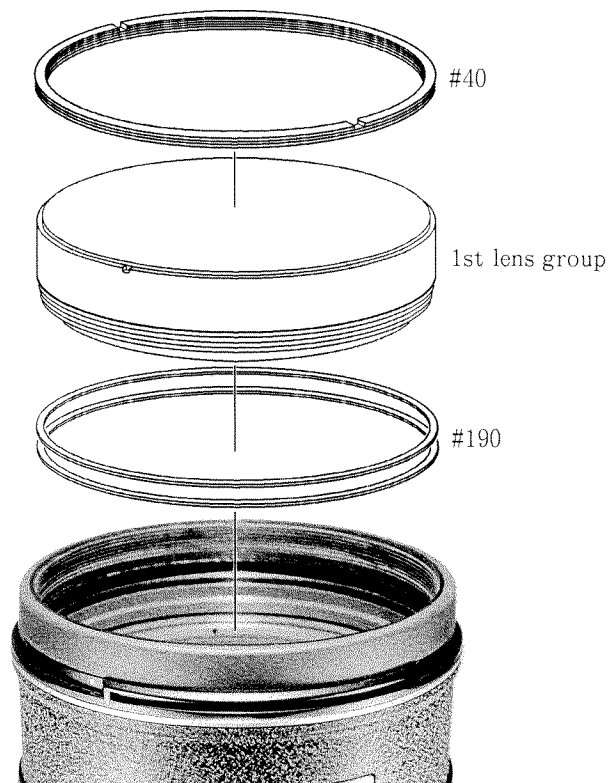
- Remove the communication tool, and then apply a tape TA-0001 on the FPC communications contact for protection.



RUBBER RING #35



1st LENS GROUP



ADJUSTMENT OF SHIFT FOCUS (TELE AND WIDE)

1. Align the ∞ mark on focus ring to index. Set aperture to full aperture.
2. Read the value on both Wide and Tele sides respectively.
3. Calculate the following equation.

$$(A - B) \div 0.7485 = C$$

A = Value of Tele side (mm)
 B = Value of Wide side (mm)
 C = Amount (mm) of adjustment of 1st lens group washer #190

4. Adjust the thickness of washer #190 by the value C calculated from the above equation.
 If the value C is positive, thicken the washer by the value, and if negative, thin the washer.

Note : Insert thin washer between thick washers when mounting washer #190.

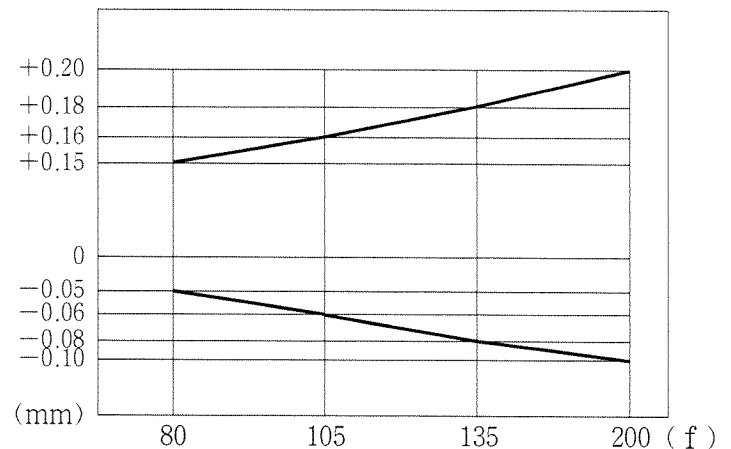
(Refer to page L33.)

ADJUSTMENT OF BACK FOCUS

1. Align the ∞ mark on focus ring to index. Set aperture to full aperture.
2. Readout values at either Wide or Tele side.
3. Remove the Rear cover ring and aperture ring.
4. If the value is above the standard, increase the thickness of the washer, otherwise decrease it.
5. Confirm that the value is within the standard range.

(Refer to page L23.)

Focal length (f)	Standard (mm)
80 mm	- 0.05 ~ +0.15
105 mm	- 0.06 ~ +0.16
135 mm	- 0.08 ~ +0.18
200 mm	- 0.10 ~ +0.20



Preparation for adjusting Main FPC

- In case of replacing the main FPC, SWM unit or MR encoder unit, be sure to make the below adjustments which will be required.

1. Adjustments

- Pulse adjustment for the MR encoder
- Scanning speed adjustment (drive frequency inspection)
- Oscillation circuit adjustment

2. Necessary device

- Single output rated voltage power supply: 1 - 3 unit(s)

Contact A for mount: 5.0 - 5.5V 100mA

Contact F for contact G: 6.0A 3.0A

In case of using double output power supply: 5.0V 2.0A

- Multiple output rated voltage power supply: 1 unit for H8 D/A converter (for F/V converter)

In case of using the double output power source: $\pm 15.0V$ 300mA

In case of using the triple output power source: $\pm 15.0V$ 300mA

+ 5.0V 2.0A

- H8D/A converter (J15334) (F/V converter): 1 unit for adjusting scanning speed
- Oscilloscope: 1 unit for adjusting the pulse of the MR encoder and for adjusting the scanning speed
- Frequency counter: 1 unit for adjusting the scanning speed and for adjusting the oscillation circuit
- Communication tool (J15353): 1 unit
- Switch tool (J15355): 1 unit

< Reference >

Even only 1 unit of the single output rated voltage power source can supply power necessary for the adjustment. In this case, however, the voltage value must be fixed to 5.0V.

Caution:

In case there is some defective conduction found between the communication tool and the main FPC, the main FPC contact surface may be corroded or oxidized. Therefore, polish the contacts then connect the FPC.

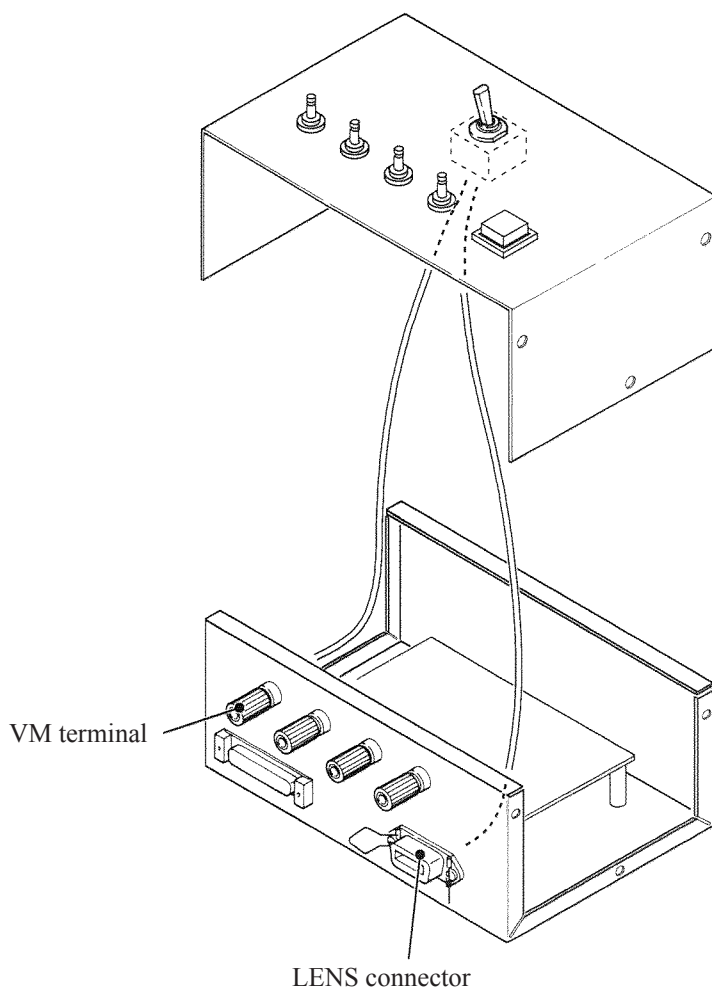


3. Preparation of lens for measurement

- Connect the rated voltage power supply, the measuring tools, and the communication tool as shown in the next page.
- Arrange connections as seen in "AF-S lens inspection system". (ref. Page L39)

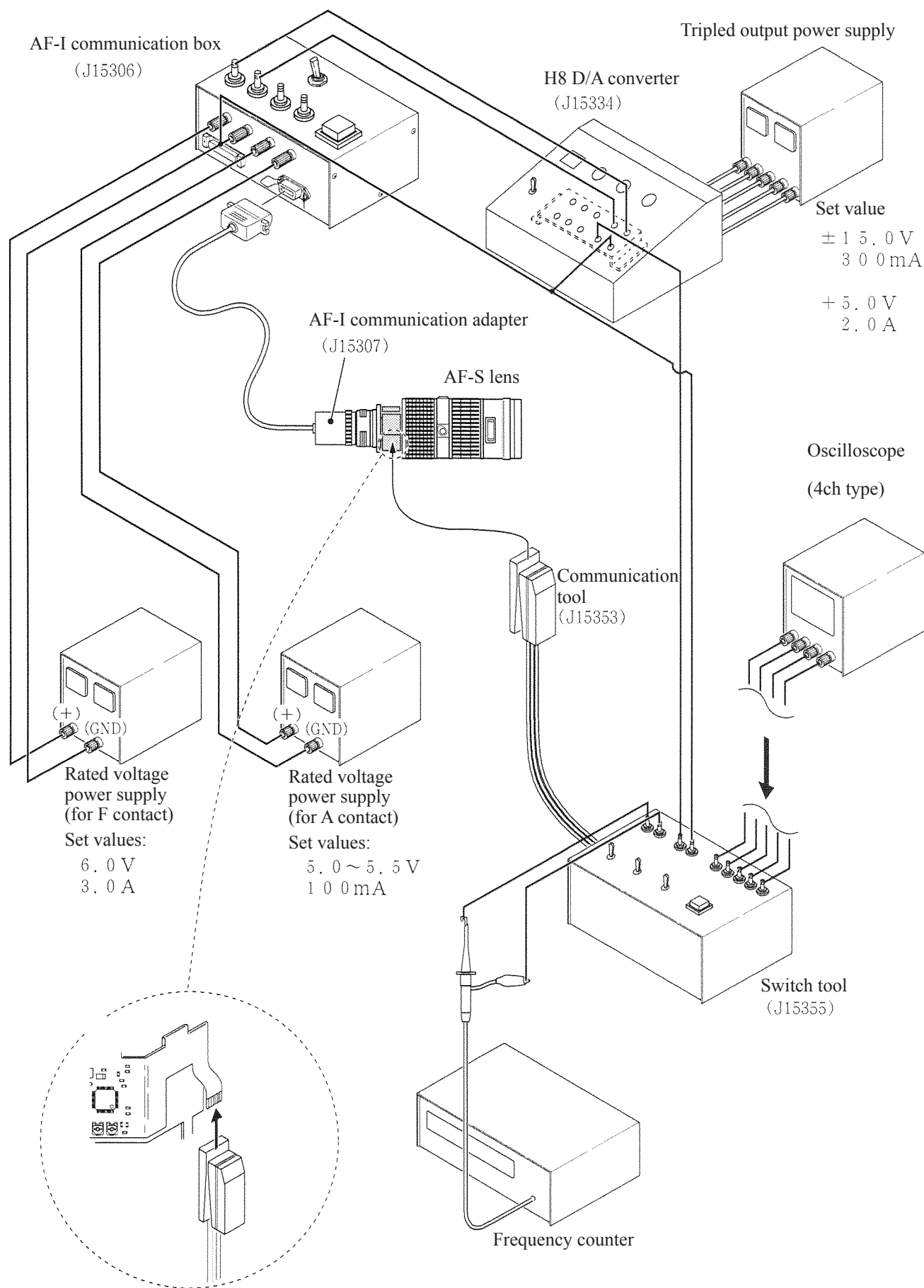
In case the DC-DC converter is already connected in the AF-I communications box, the rated voltage power supply (for contact A) is not necessary.

- In case of measuring the AF-S zoom lens, the AF-I communications box needs to be converted as below.

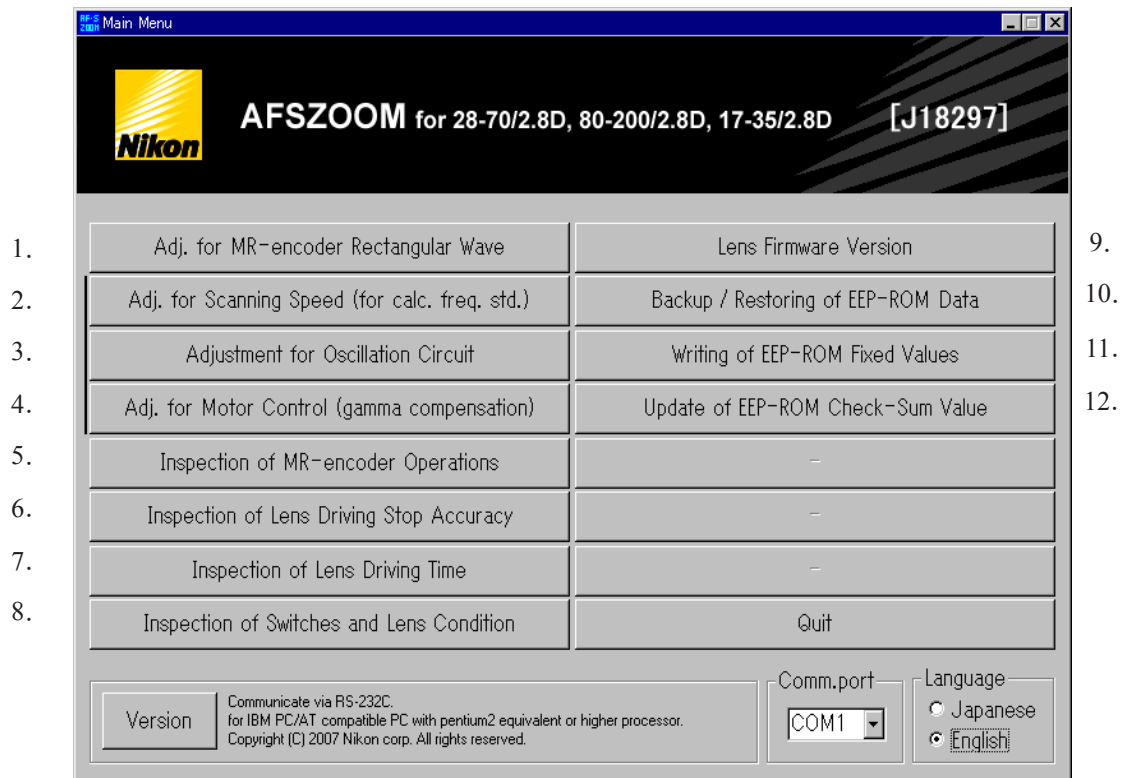


- Connect the toggle switch between the VM terminal and the 1 pin (F contact) of the LENS connector, then perform wiring.
- In order that the lens drive mode selector switch is set to "M/A", do NOT short the white lead wire with the orange lead wire that are to be soldered on the change-switch.





AF-S Zoom lens (New) Inspection Program



- Menu items

Items "1." is used for adjustments.

Items from "2." through to "4." are used for adjustments. Be sure to perform starting from "2." in numeric order.

Items from "5." through to "8." are used for inspection

Item "9." is used for confirming firmware

Item from "10." through "12." are used for reading/writing EEPROM DATA.

- Selecting items

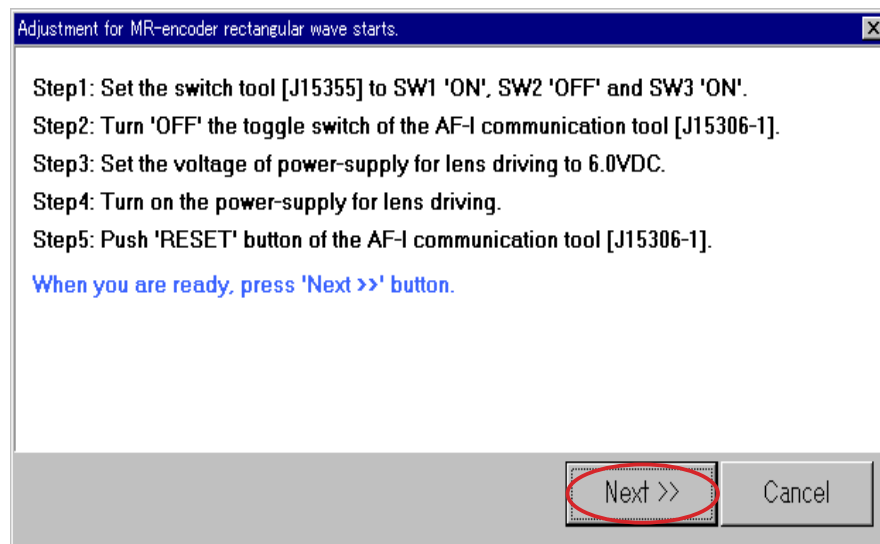
Follow the instructions that will appear after selecting each item on the PC.

Pulse adjustment for MR encoder

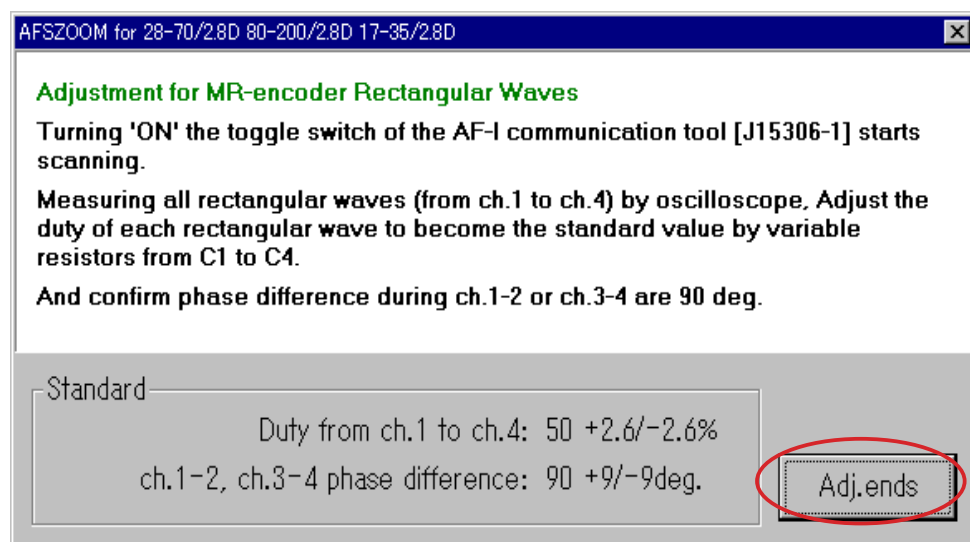
- When the MR encoder is replaced, be sure to make this adjustment.

How to adjust:

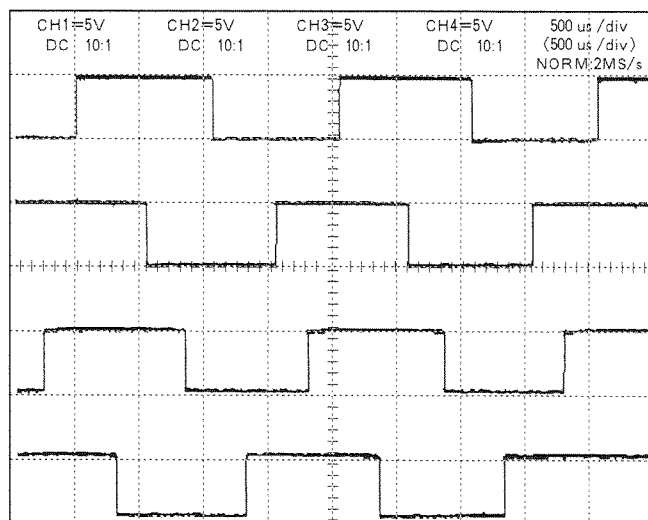
- Select "Adj. for MR encoder Rectangular Wave" on the menu.
- Follow the instructions on the screen for preparation. Then click "Next".



- With reference to ① - ⑤ , make the adjustment so that the results become within standard. When the adjustment is completed, click "Adj.ends" to complete.



- ① Stop the waveform movement of the oscilloscope by pressing "START/STOP" key.
(Make the horizontal length of H/L be within approx. 2-3 div.)

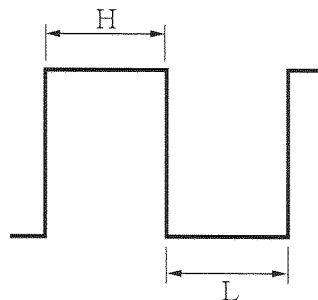
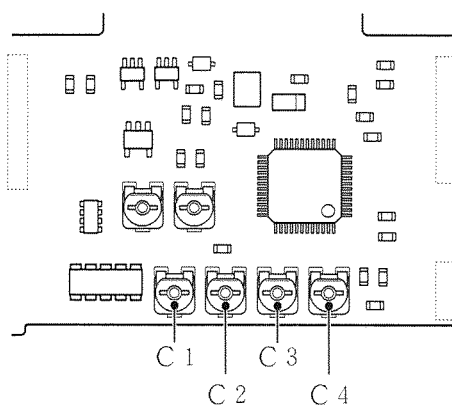


● Oscilloscope setting

V/Div (CH1)	: 5V
V/Div (CH2)	: 5V
V/Div (CH3)	: 5V
V/Div (CH4)	: 5V
Coupling	: DC
Time/Div	: 1m Sec
Trigger Mode	: AUTO
Trigger Coupling	: DC
Trigger Source	: CH1
Trigger Position	: - 4 div
Trigger Type	:
Trigger Level	: 2.5 V

- ② Adjust the ratio of "H" and "L" of each CH1 - CH4 by VR (semi-fixed resistor).

Standard H:L = 9:10 ~ 10:9



CH1 : C1 (VR)

CH4 : C4 (VR)

When "H" is long: Turn "C1-4 (VR)" clockwise.

When "L" is long: Turn "C1-4 (VR)" counterclockwise.

Caution:

In case the adjustment is impossible by VR (semi-fixed resistor), replace the MR encoder unit.

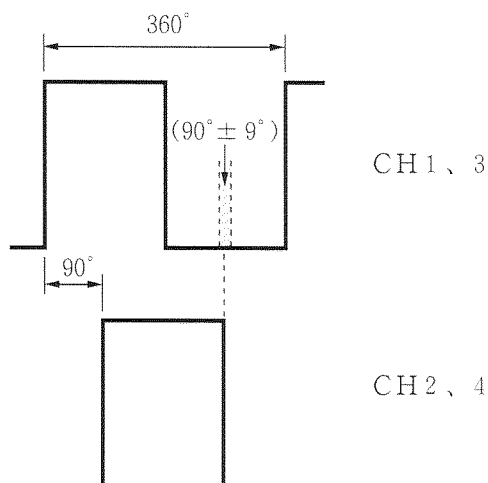


- ③ After adjusting the ratio of "H" and "L", confirm that "CH1" is "90°" ahead of "CH2" as below. In addition, confirm that "CH3" is "90°" ahead of "CH4" as well.

Standard: $90^\circ \pm 9^\circ$ or less

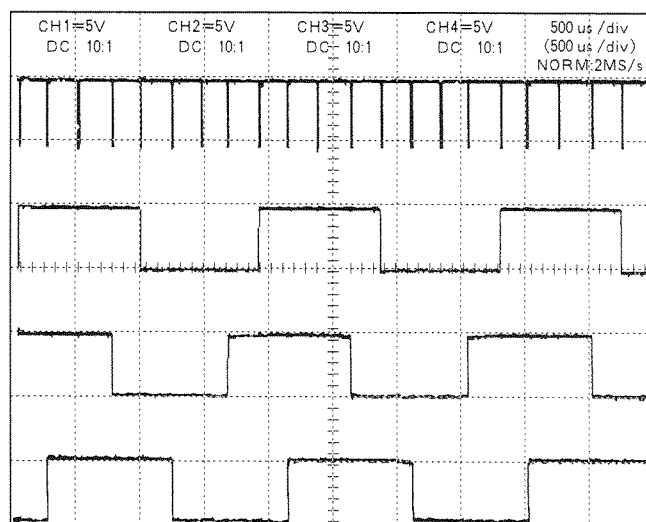
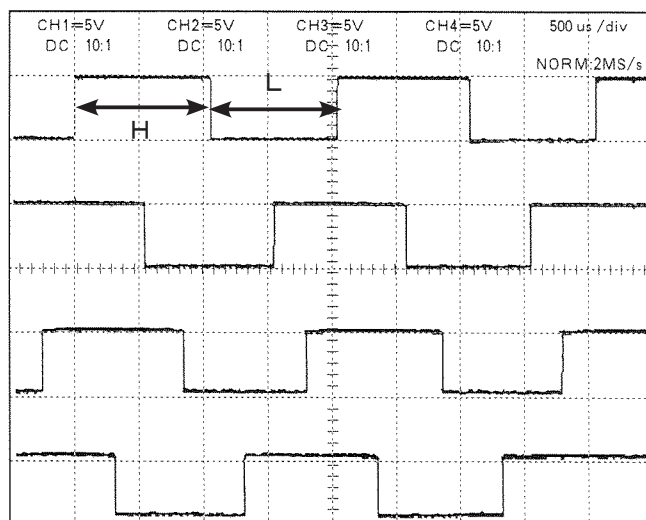
Caution:

When the focus index ring is rotated from "Close" to "Infinity" position, CH2 and CH4 become 90° ahead of CH1 and CH3. In case of out-of-standard values, replace the MR encoder unit.



- ④ Press Switch "4" of the switch tool.

- ⑤ Stop the waveform movement of the oscilloscope by pressing "START/STOP" key, and confirm that "H" and "L" are equal length.



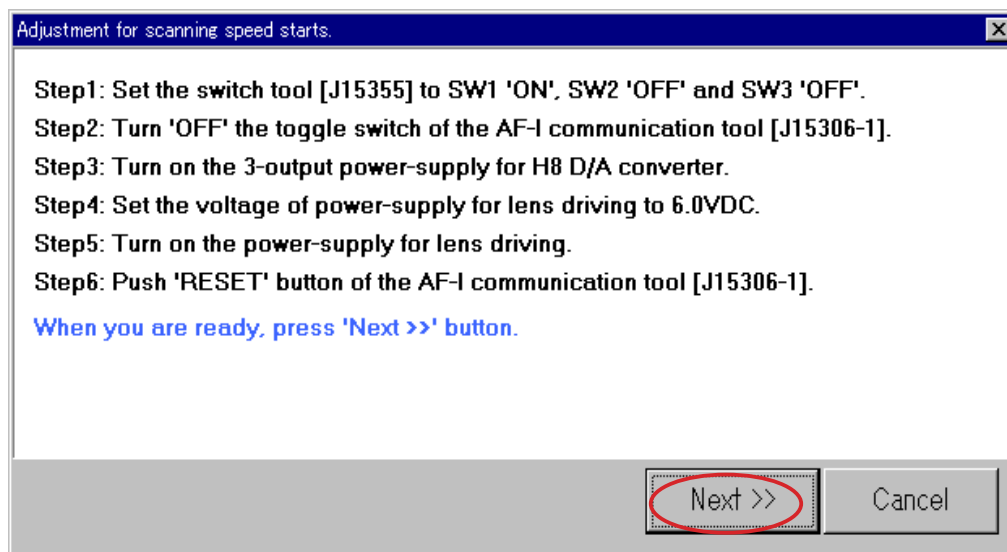
- **Setting of Oscilloscope**
Change only Trigger mode to "SGL [S]".

Scanning speed adjustment (for calculating frequency standard value)
--

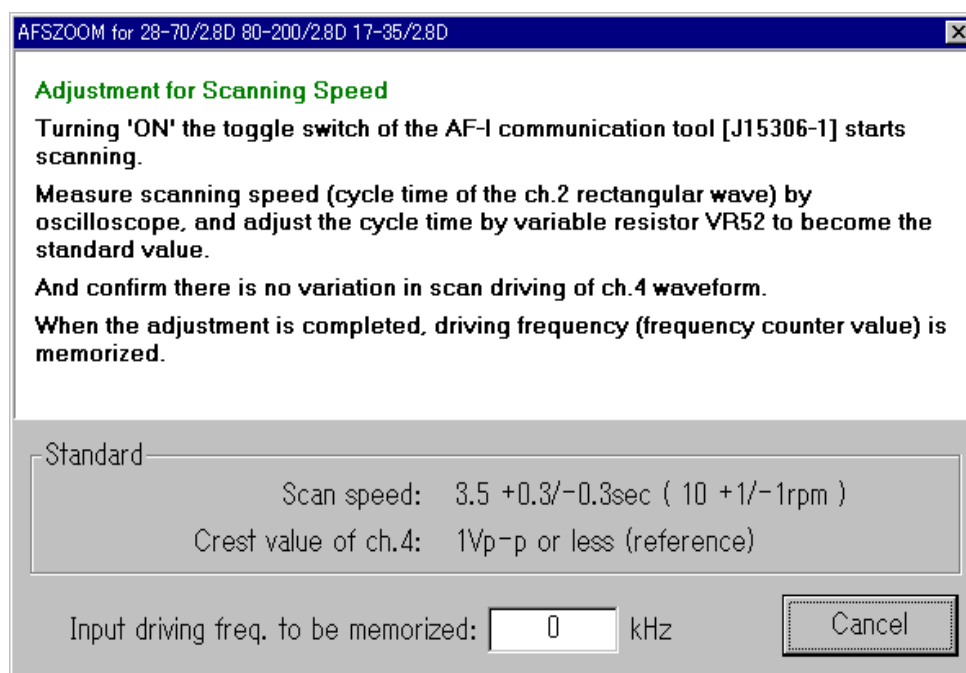
- This adjustment is for calculating the frequency adjustment value which is used for the oscillation circuit adjustment. When the main FPC, SWM unit, or MR encoder unit is replaced, be sure to make this adjustment.

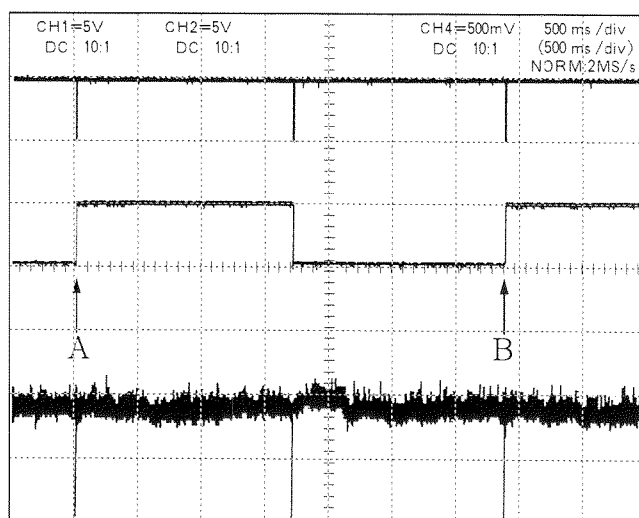
How to adjust:

- Select "Adj. for Scanning Speed (for calc. freq. std.)" on the menu.
- Follow the instructions on the screen for preparation. Then click "Next".



- When the toggle switch is turned ON, scanning drive starts. Make the adjustment so that the result becomes within standard, then "input driving frequency to be memorized".





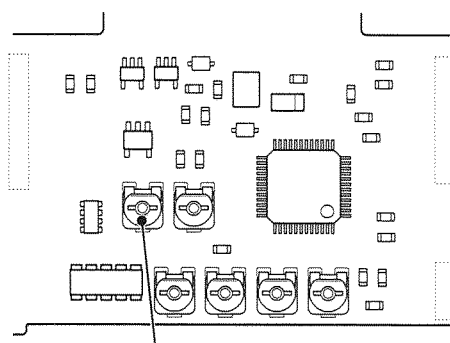
● Oscilloscope setting

V/Div (CH1)	: 5V
V/Div (CH2)	: 5V
V/Div (CH3)	: OFF
V/Div (CH4)	: 500mV
Coupling	: DC
Time/Div	: 500m Sec
Trigger Mode	: NORMAL
Trigger Coupling	: DC
Trigger Source	: CH1
Trigger Position	: - 4 div
Trigger Type	:
Trigger Level	: 2.5 V

Adjust the scanning speed value (waveform A - B of Oscilloscope CH2) by VR (semi-fixed resistor).

Scanning speed value: 3.5 ± 0.3 sec (10 ± 1 rpm)

[Main FPC]



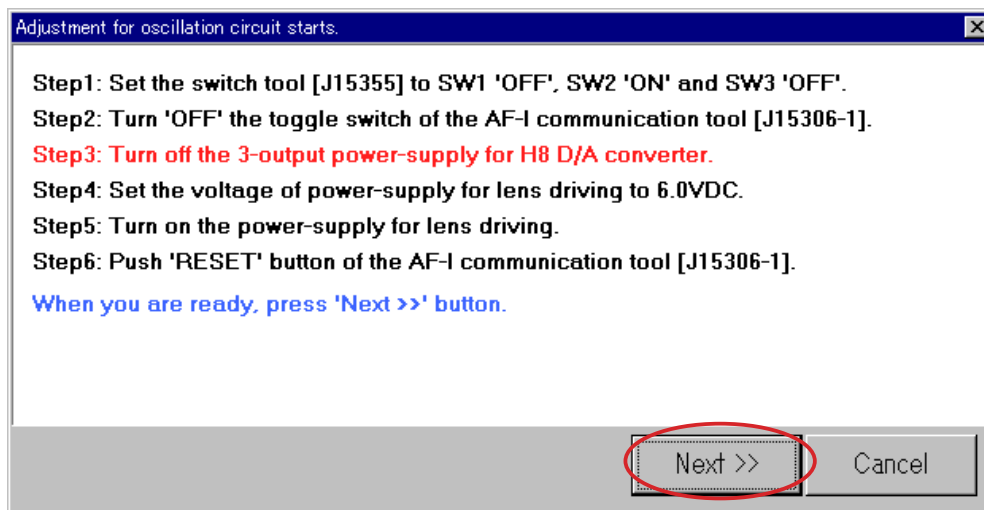
VR 5 2 (for adjusting scanning speed value)

Oscillation circuit adjustment

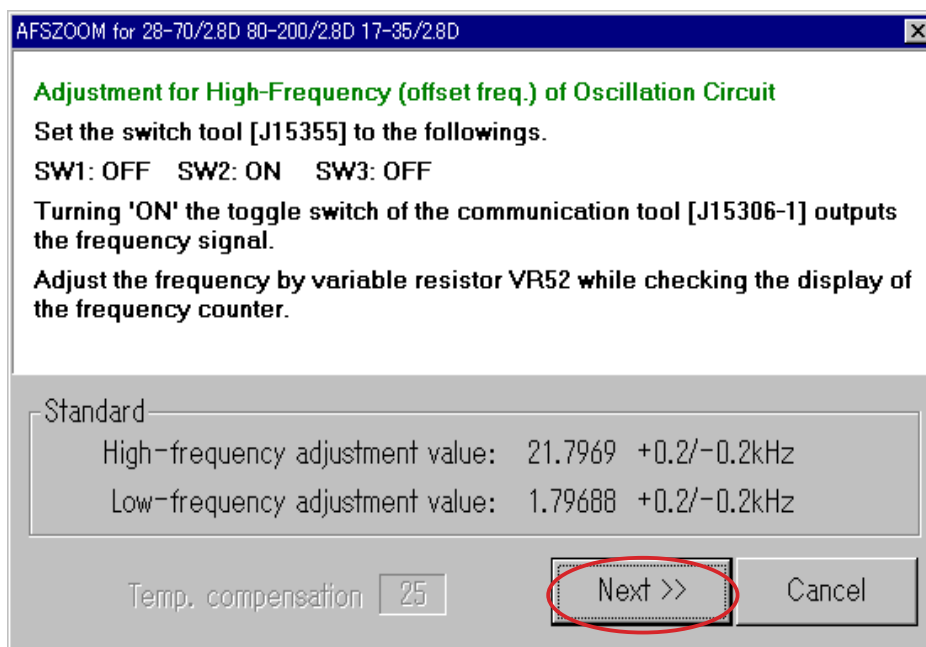
- This adjustment is the frequency adjustment for rotating the SWM. After adjusting the scanning speed, be sure to make this adjustment.

How to adjust:

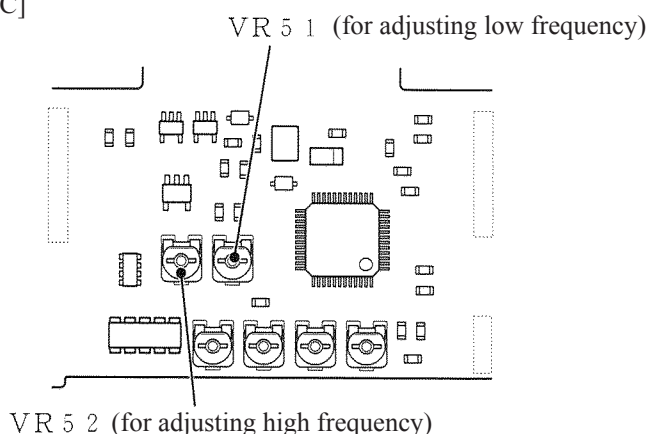
- Select "Adjustment for Oscillation Circuit" on the menu.
- Follow the instructions on the screen for preparation. Then click "Next".



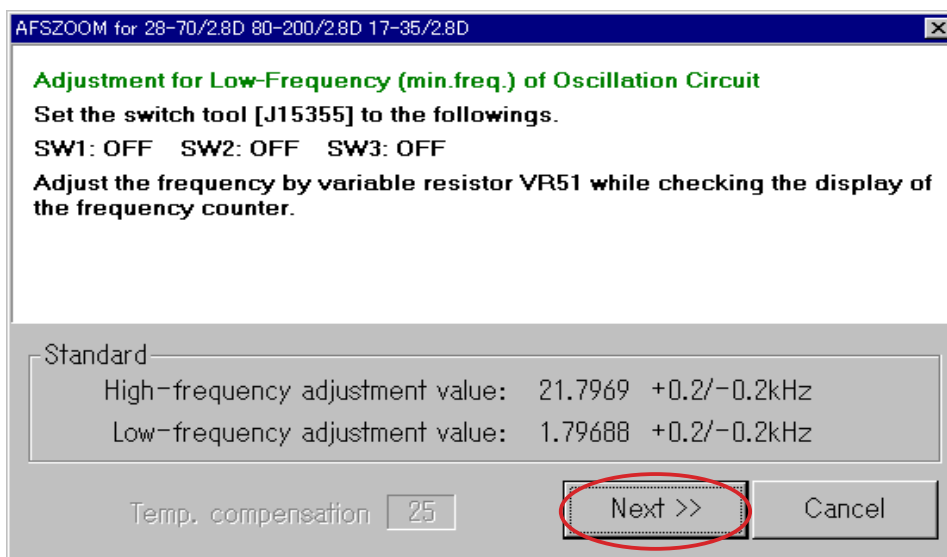
- By following the instructions on the screen, adjust high-frequency wave. When the adjustment is completed, click "Next".



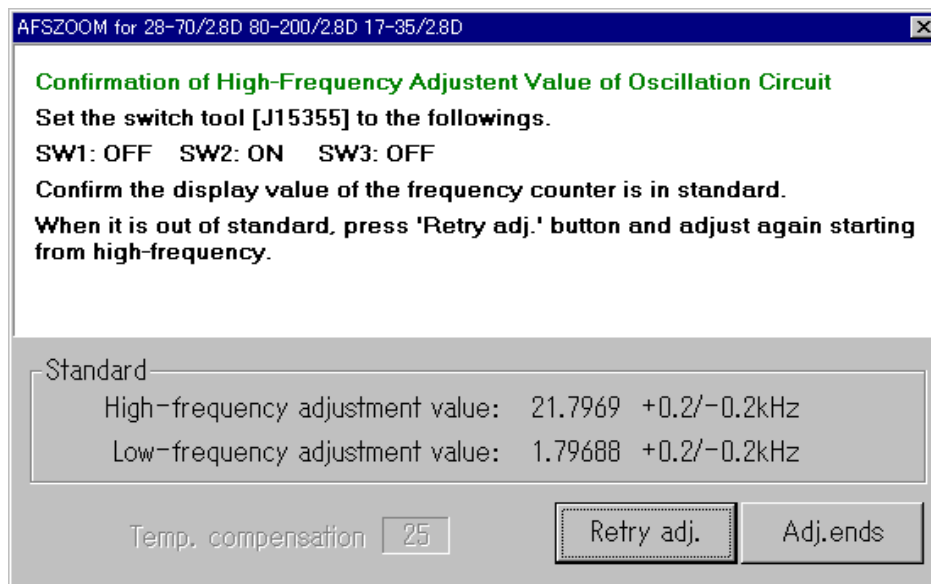
[Main FPC]



- By following the instructions on the screen, adjust low-frequency wave. When the adjustment is completed, click "Next".



- By following the instructions on the screen, check the frequency adjustment value. If the result is not within standard, make the readjustment.
 When the adjustment is completed, click "Adj.ends" to complete.

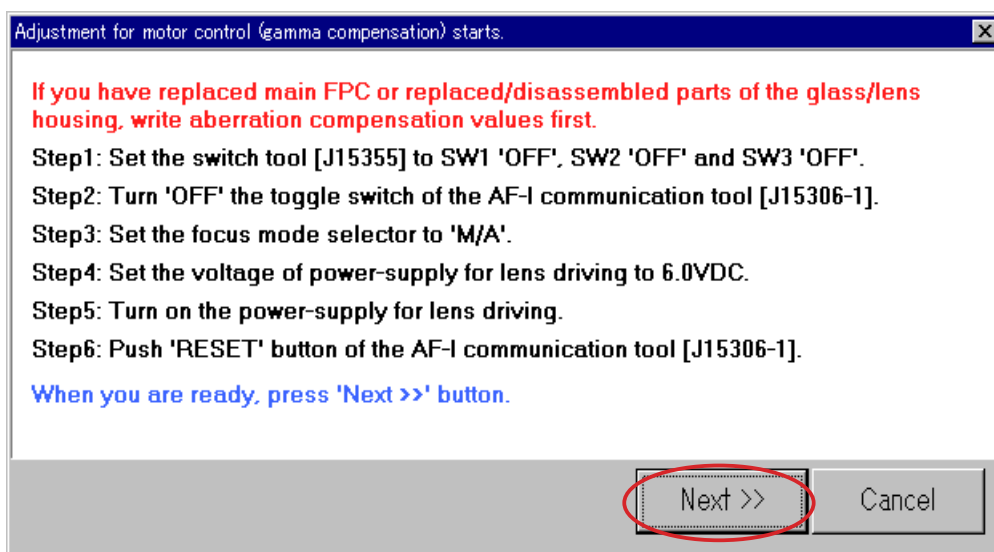


Motor control adjustment (Gamma compensation)

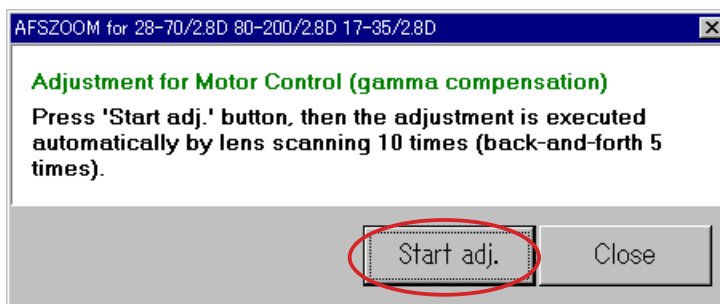
- This adjustment is for optimizing the initial drive of the SWM. Be sure to make this adjustment after adjusting oscillation circuit.

How to adjust:

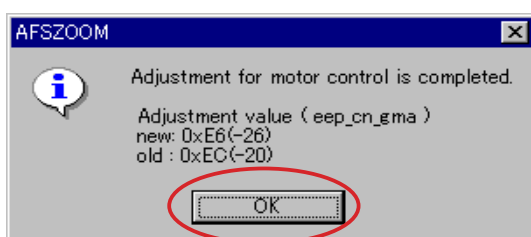
- Select "Adj. for Motor Control (gamma compensation)" on the menu.
- Follow the instructions on the screen for preparation. Then click "Next".



- Click "Start Adj.".



- When the adjustment is completed, click "OK" to complete.



Inspection of MR-encoder operations

How to inspect:

- Select "Inspection of MR-encoder Operations" on the menu.
- Click "Start insp."

Caution:

When the MR ring is rotated during the lens-scan driving, the number of pulses shows an abnormal value.
So do NOT touch the MF ring in operation.

- When the inspection is completed, the result will appear. Click "Close" to end.

Standard

"Difference in pulse no.": 0 ± 10 PULSE(S)

"Total no. of pulses": 6590 ± 6710 PULSE(S)



Inspection of Lens driving stop accuracy
--

- Make this inspection on both focal length 80 mm (W) and 200 mm (T) at the five lens positions of the following:

(Lens position when inspecting)

Tilt of Lens	Position of index window
Horizontal	Up / Right / Left
Front lens group 90° angle upward	
Front lens group 90° angle downward	

How to inspect:

- Select "Inspection of Lens Driving Stop Accuracy" on the menu.
- Click "Start insp."
- If the lens stops during the inspection, input a figure [from "0" to "1000" (msec: millisecond) to delay the process] which prevents stopping the lens, into the below "Delay time" entry field. If the lens stops during the inspection, input a figure [from "0" to "1000" (msec: millisecond) to delay the process] which prevents stopping the lens, into the below "Delay time" entry field.

Note:

The delay time is the setting value set by the adjustment software. So, if the lens does not stop during "Inspection of Lens Driving Stop Accuracy" in the end, any value can be input without problem. However, the larger the value of "ADJUST DELAY-TIME" gets, the longer the inspection time becomes.

AFSZOOM for 28-70/2.8D 80-200/2.8D 17-35/2.8D

Inspection of Lens Driving Stop Accuracy
Driving from Df1 to Df6 is repeated automatically, and servo-motor driving stop accuracy is measured.

Lens back-and-forth count: **0 / 5** Lens driving count: **0**

Overrun / Underrun pulse number: **0 (max.value: 0)**

Overrun / Underrun error rate

Error range	Df1	Df2	Df3	Df4	Df5	Df6	Standard
0-0 pulses:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	40.0% or less
0-0 pulses:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.0% or less

Zoom position
☐ Wide-end
☐ Tele-end

Delay time (from 0 to 1000): **0** msec

☐ Lens-tilted inspection at +90/-90deg. angle

Start insp. Close

Tick the checkbox when
Front lens group 90° angle
upward/downward

- The following screen will appear during the lens driving.

Caution:

When the MR ring is rotated during the lens-scan driving, the number of pulses shows an abnormal value.
So do NOT touch the MF ring in operation.

- When the operation check is completed, the result will appear. Click "Close" to end.

The number of overrun/underrun pulses must be within the standards after the lens back-and-forth driving-motion five times.

- Standard Df1~Df6: 40% or less ②
(4 - 9 pulse occurrence ratio)
- Df1~Df6: 10% or less ③
(7 - 9 pulse occurrence ratio)
- 10-or-more pulse occurrence: 0 for DF1 ~ Df6 . . . ①
(Even only one occurrence is judged as defective.)

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



Inspection of Lens driving stop accuracy
--

How to inspect:

- Select "Inspection of Lens Driving Stop Accuracy" on the menu.
- Make this inspection on both focal length 80 mm (W) and 200 mm (T) at the five lens positions of the following:

(Lens position when inspecting)

Tilt of Lens	Position of index window
Horizontal	Up / Right / Left
Front lens group 90° angle upward	
Front lens group 90° angle downward	

- Select each driving amount. Confirm that each lens driving time is within the standard.

Caution: When the MR ring is rotated during the inspection, the waveform shows an abnormal value. So do NOT touch the MF ring during the inspection.

- If the inspection result is within standard, click "Close" to end.

AFSZOOM for 28-70/2.8D 80-200/2.8D 17-35/2.8D

Inspection of Lens Driving Time

The time taken for servo-motor driving from Df1 to Df6 is measured by oscilloscope.

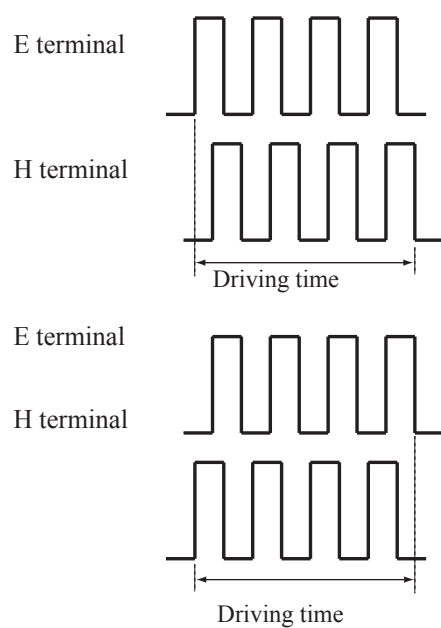
Drive amount	Standard	Standard (+90/-90deg.)	
Df1	40msec or less	47msec or less	Drive Df1
Df2	50msec or less	59msec or less	Drive Df2
Df3	65msec or less	77msec or less	Drive Df3
Df4	80msec or less	95msec or less	Drive Df4
Df5	100msec or less	119msec or less	Drive Df5
Df6	115msec or less	137msec or less	Drive Df6

Zoom position

☒ Wide-end
☐ Tele-end

Driving to close-end
 Driving to inf.-end

Close



●Oscilloscope setting

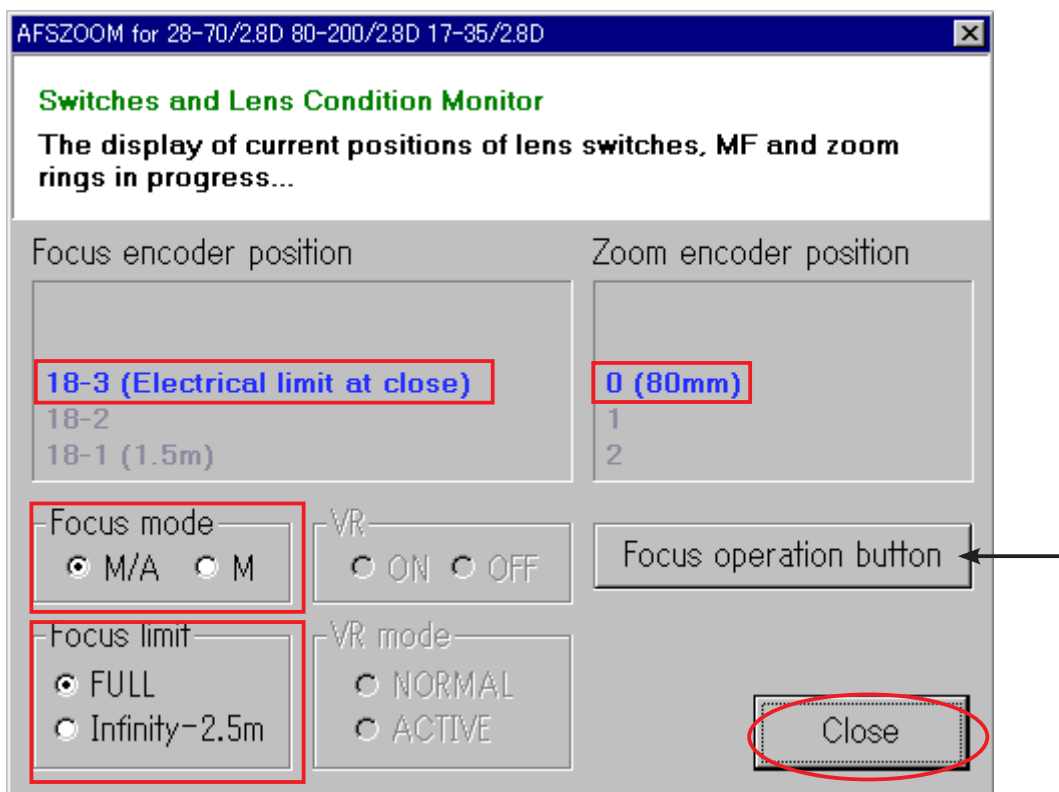
V/Div	: 5V
Coupling	: DC
Time/Div	: 20 m Sec
Trigger Mode	: SGL (S)
Trigger Coupling	: DC
Trigger Source	: CH1

※ There are two types in shape of waveforms of E and H terminals:
Waveform (1) starts and goes up (2) starts and goes down.

Inspection of switches and lens conditions
--

How to inspect:

- Select "Inspection of Switches and Lens Condition" on the menu, and inspect each switch and encoder position.



- Clicking the focus lock button of the lens changes the screen indication to the following:

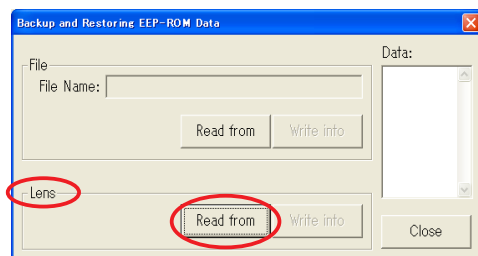


Backup of EEPROM

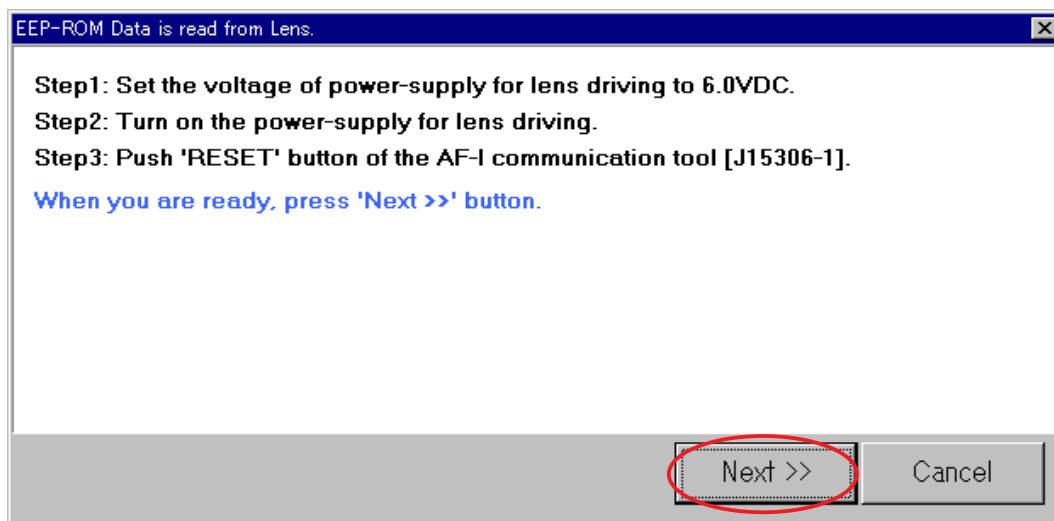
How to backup data:

- Select "Backup/Restoring of EEP-ROM Data" on the menu.

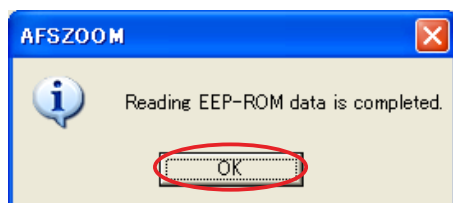
- • Click ["Read from" Lens] button.



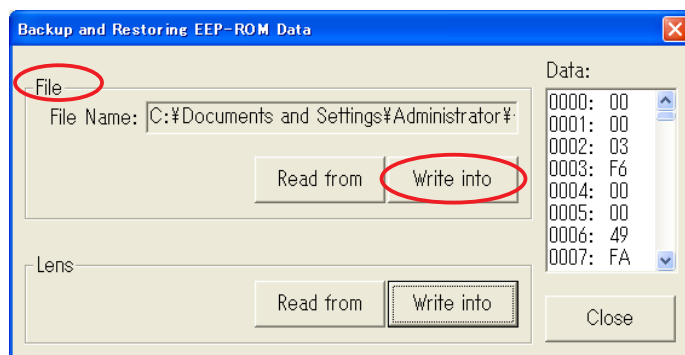
- Follow the instructions on the screen for preparation. Then click "Next".



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

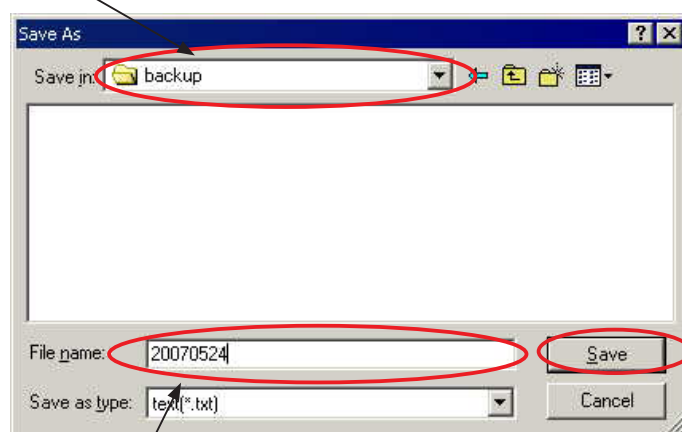


- Click "Write (Save)" into "File".



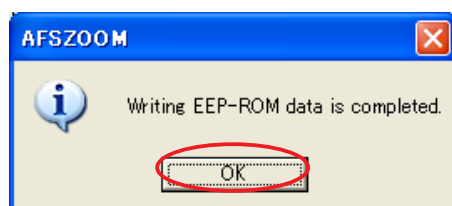
- Enter an appropriate file name for any folder, and click "Save".

e.g.

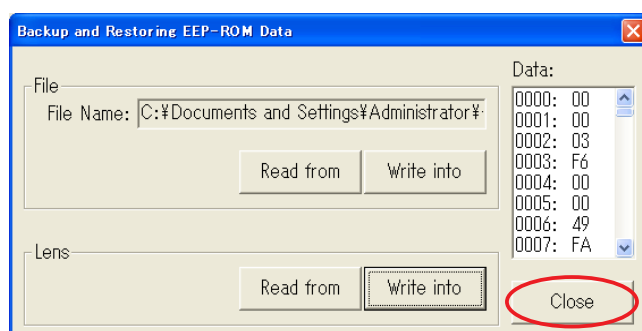


File name

- Click "OK".



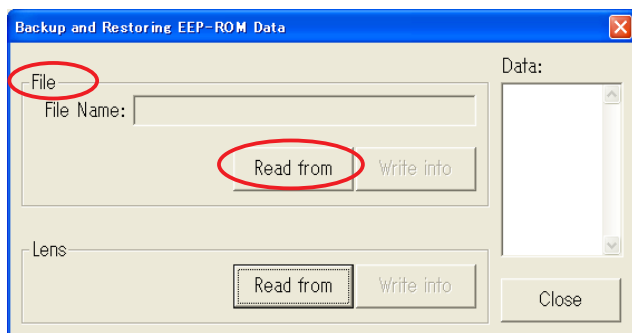
- Click "Close" to end.



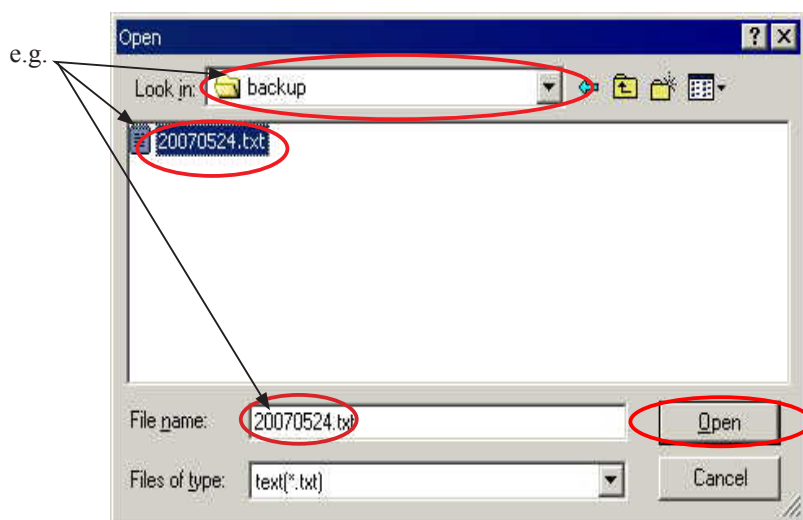
Restoring of EEP-ROM

How to restore backup data:

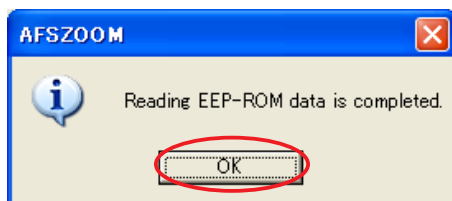
- Select "Backup/Restoring of EEP-ROM Data" on the menu.
- Click "Read (Load)" of "File".



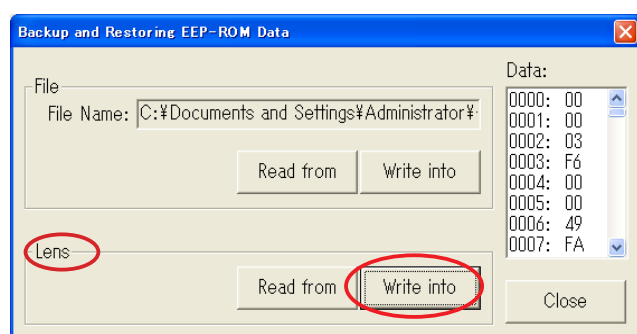
- Select the file name of the folder that was saved as backup, and click "Open".



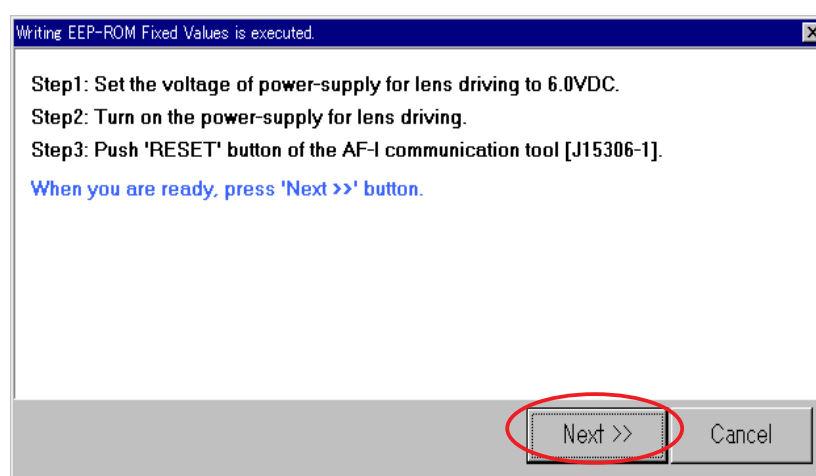
- When reading EEP-ROM data is completed, click "OK".



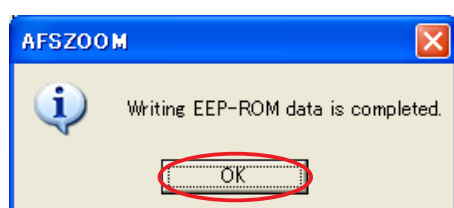
- Click "Write" into "Lens".



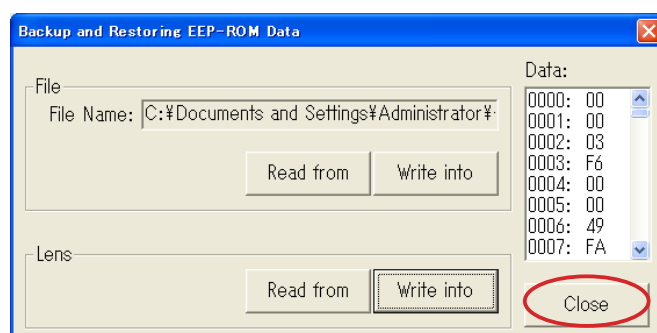
- Follow the instructions on the screen for preparation. Then click "Next".



- When writing EEPROM data is completed, click "OK".



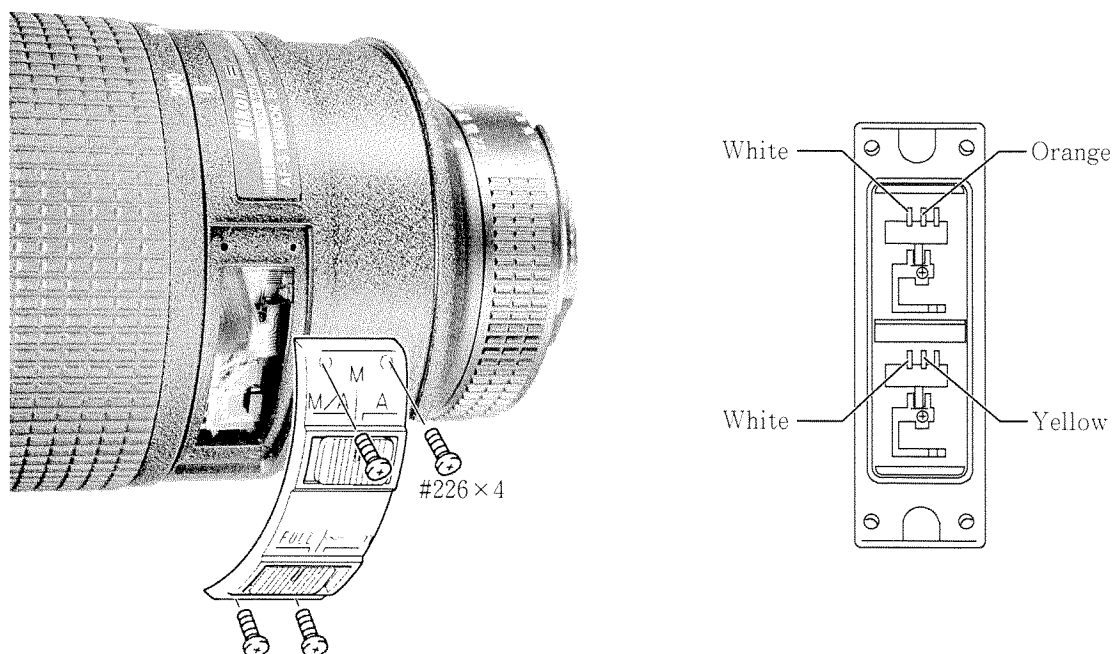
- Click "Close" to end.



REAR HOUSING



CHANGE-OVER SWITCH UNIT



LENS OPERATION CHECK

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

○ Check by using a personal computer

● Check items

1. Operation of MR encoder

- Drive the lenses for scanning and check the difference in pulses at start and at end.
- In case the MR encoder's MR head is not properly attached on the magnetic tape, comparing to the numbers of encoder pulse at first measurement, there arises any difference(s) in the numbers of encoder pulse at final measurement.

2. Lens driving stop accuracy

- Check the overrun/underrun pulse (misalignment of the stop position against the aimed position) for the specified lens actuation.
- When mechanical irregular operation does not occur in the focus ring drive unit, underrun occurs if the cam ring rotary weight of the MR encoder is heavy and overrun occurs if it is light.

3. Lens servo time

- Check the servo time (time from servo start to stop) with an oscilloscope when the specified lens is actuated.
- When man-made irregular operation does not occur in the focus ring drive unit, the servo time is long if the cam ring rotary weight of the MR encoder is heavy and is short if it is light.

4. Check of switches

- Check how each switch works from turning-on / off, and the operation mode on the distance information encoder and the zoom encoder each.

⚠ ● How to treat after inspection

(Revise) 1. For the MR encoder's out-of-criteria operation mode

Adjust the pulse again as explained in the page L28.

In the case of pulse out of criteria, adjust the output pulse / waveform from the MR encoder again.

For its details, refer to the page L10-1.

In the case of pulse within the criteria, replace the MR encoder unit.

2. For the lens servo accuracy at rest is out of criteria

Check the output pulse / waveform from the MR encoder.

Then, if normal, replace the MR encoder unit.

3. For the lens servo period of time is out of criteria

Adjust the scanning speed again.

Even after readjustment, it is still out of criteria, replace the MR encoder unit.

4. For malfunction after turning on / pressing any switches

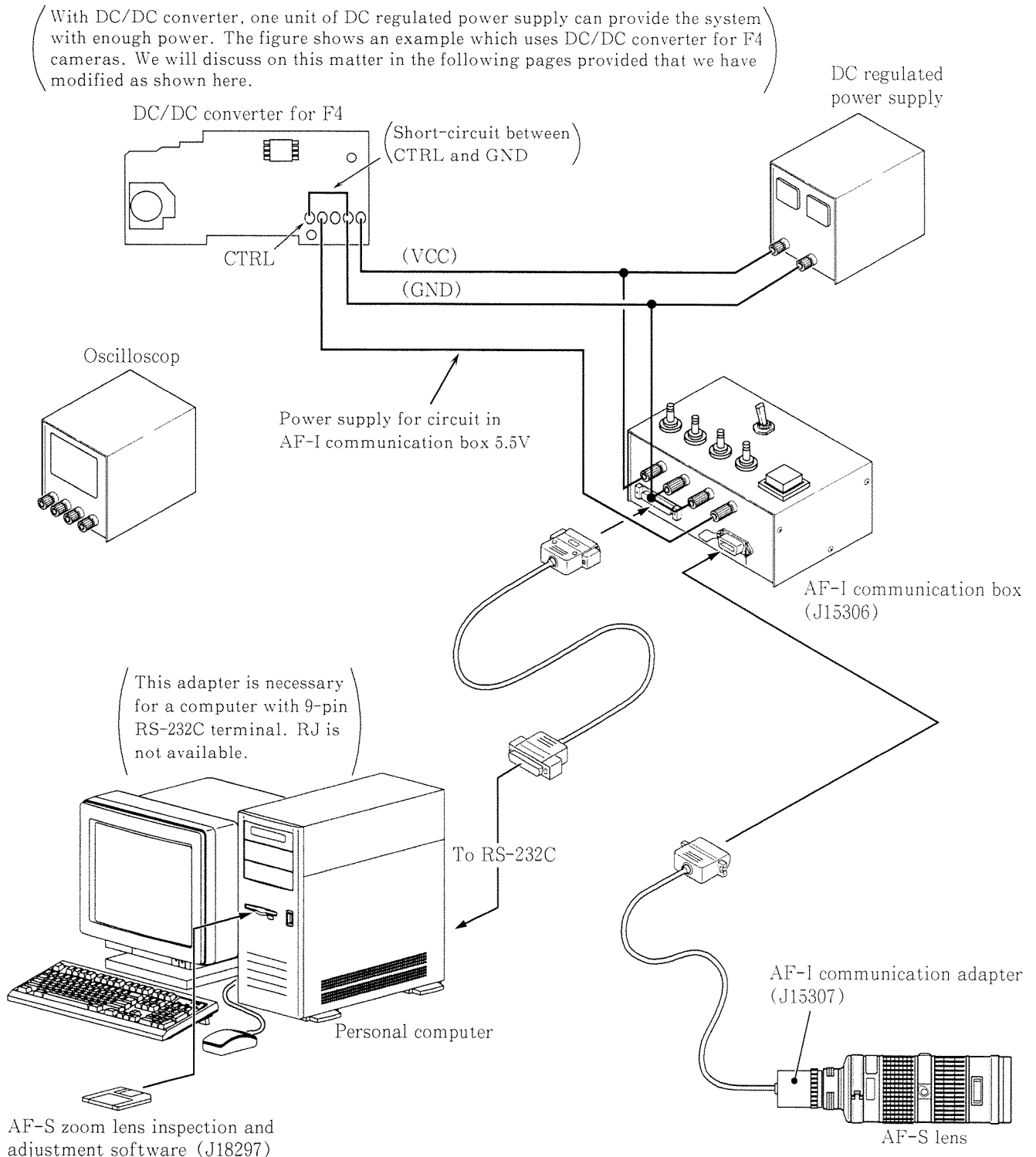
Check the wiring pattern of such troubled switch(es), or replace it.



● AF-S lens inspection system

This system consists of AF-S zoom lens inspection and adjustment software (J18297), AF-I lens communication adapter (J15307), AF-I communication box (J15306), personal computer, oscilloscop and DC-regulated power supply. With this system, when making inspection of an AF-S zoom lens, you can monitor lens operation and condition and get a numerical readout on the computer screen by simulating the same conditions as when the AF-S lens is mounted on the actual camera body. As a result, it is possible to check AF-S lens accuracy in various respects and to decide whether or not the lens is in good condition or is defective. Troubleshooting for the AF-S lens is now simpler and more effective.

【System diagram】



• Explanation of the AF-S lens inspection program

(1) Menu display

△
(Revise)

NIKON AF-S ZOOM LENS INSPECTION / ADJUSTMENT PROGRAM.		[J18297]
1. MAIN FPC ADJUSTMENT.	9. -----	
2. CHECK-UP OF THE DRIVING FREQUENCY.	A. -----	
3. READ AND REWRITING OF EEPROM DATA.	B. -----	
4. OPERATION OF MR ENCODER.	C. -----	
5. LENS DRIVING STOP ACCURACY.	D. -----	
6. LENS SERVO TIME.	E. -----	
7. SWITCHES AND LENS CONDITION.	F. -----	
8. ADJUSTMENT FOR MOTOR CONTOROL	G. RETURN TO THE SYSTEM.	
<p>SELECT THE DEMANDED ARTICLE BY ←→ KEY, AND PUSH ENTER KEY. OR, SELECT COMMUNICATE BY RS232C TERMINAL. THE DEMANDED ARTICLE BY ITS NUMBER. FOR IBM PC/AT DOS/V CLONE. (286-PENTIUM2) COPYRIGHT (C) 1999-09-20 NIKON CORP. BORLAND C++ VERSION 3.1 COPYRIGHT (C) 1992 BORLAND INTERNATIONAL.</p>		

• Menu items

The item 1 and 2 are adapted for adjustment of the main FPC.

The item 3 is adapted for the aberration compensation.

The item 4 to 7 are adapted for check and inspection.

△
(Addition) The item 8 is adapted for the adjustment for motor contorol.

• Selection of item

After selecting any item, either one or multiple menu(es) from 'selection mode for switch position on the switching tool', 'lens selection mode', 'voltage set-up mode' and / or 'inspection start mode' is / are displayed.

The images are different for the items. Obey the instructions of a personal computer.

• Operating voltage

	Power supply for AF motor in lens	Power supply for AF-I communication box
Inspection of MR encoder operation	6.0 ± 0.1 V	5.5 V ± 0.2 V
Inspection of lens servo stop precision	6.5 ± 0.1 V	
Inspection of lens servo time	6.5 ± 0.1 V	
Inspection of switches and lenses	6.0 ± 0.1 V	

• Initial driving

When "WAIT FOR SOME SECOND" is displayed, execute initial driving (repeat scanning ~~three~~ five times and stop at infinity end).

△
(Revise)



(2) Image of "operation of MR encoder"

TYPE OF LENS : AF-S NIKKOR 80-200mm/2.8D	CPU VERSION : 5.04.02
OPERATION OF MR ENCODER.	
INSPECTING.	
PUSH ANY KEY TO FORWARD NEXT STEP.	



(Revise) **Note** : If the MF ring is rotated during lens scanning, an error value is shown for the pulses.

Don't touch the MF ring during operation.

The lens scanning is repeated while the above screen is shown. After more than one lens scanning, press any key to go to the next screen.

Execute inspection for the 5 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 90° upward	
Front group 90° downward	

The difference between the pulses before and after inspection must be within the standard.

Standard : 0 ± 1 0 PULSE (S)

△
(Revise)

TYPE OF LENS : AF-S NIKKOR 80-200mm/2.8D CPU VERSION : 5.04.02
OPERATION OF MR ENCODER.

POSITION WHEN CHECK BEGINS. [PULSE (S)] ----- -2

POSITION WHEN CHECK IS ENDED. [PULSE (S)] ----- -7

PULSE NUMBER DEFFERENCE BEFORE / AFTER CHECK. [PULSE (S)] --- -5

STANDARD FOR DIFFERENCE IN THE NUMBER : FROM -10 TO 10 [PULSE (S)]

IN STANDARD.

THE TOTAL NUMBER OF PULSE (S) AT INSPECTION. [PULSE (S)] --- 6639

STANDARD FOR THE NUMBER : FROM 6590 TO 6710 [PLUSE (S)]

IN STANDARD.

PUSH ESC KEY TO RETURN TO MENY.EP.

(3) Image of “lens driving stop accuracy”

	TYPE OF LENS : AF-S NIKKOR 80-200mm/2.8D	CPU VERSION : 5.04.02
	INSPECTION OF DRIVING STOP ACCURACY.	
①	NUMBER OF LENS GO-AND-RETURN OPERATIONS.	: 5 / 5 TIME (S).
	NUMBER OF LENS LENS DRIVING TIMES.	: 272 TIME (S).
	MAXIMUM PULSE. (ABS.VALUE) (DF0+DF1+DF2+DF3+DF4+DF5+DF6):	: 5 PULSE (S).
	OVER (OR UNDER) RUN PULSE (S).	: 5 PULSE (S).
	LENS DRIVING TIMES. : DF1=68 DF2=68 DF3=68 DF4=68 DF5=64 DF6=59	
	DIRECTION : INF → CLOSE	CLOSE → INF
	AMOUNT : DF1 DF2 DF3 DF4 DF5 DF6	
	UNDER (-), OVER (+) : (-) (+) (-) (+) (-) (+) (-) (+) (-) (+) (-) (+)	
	0 - 6 : 28 6 28 6 34 0 30 4 31 3 34 0	
	7 - 18 : 0 0 0 0 0 0 0 0 0 0 0 0	
	12 - 18 : 0 0 0 0 0 0 0 0 0 0 0 0	
④	19 - : 0 0 0 0 0 0 0 0 0 0 0 0	
	DIRECTION : INF → CLOSE	CLOSE → INF
	AMOUNT : DF4 DF5 DF6 DF4 DF5 DF6	
	UNDER (-), OVER (+) : (-) (+) (-) (+) (-) (+) (-) (+) (-) (+) (-) (+)	
	0 - 6 : 25 9 30 2 26 4 34 0 31 1 27 2	
	7 - 18 : 0 0 0 0 0 0 0 0 0 0 0 0	
	12 - 18 : 0 0 0 0 0 0 0 0 0 0 0 0	
⑤	19 - : 0 0 0 0 0 0 0 0 0 0 0 0	
②	RATIO (1) (%) : Df1=0.00 Df2=0.00 Df3=0.00 Df4=0.00 Df5=0.00 Df6=0.00	
③	RATIO (2) (%) : Df1=0.00 Df2=0.00 Df3=0.00 Df4=0.00 Df5=0.00 Df6=0.00	
	PUSH ESC KEY TO RETURN TO MENU.	

Note : If the MF ring is rotated during lens scanning, an error value is shown for the pulses. Don't touch the MF ring during operation.

The above image is displayed during lens scanning. Execute inspection for the 5 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 90° upward	
Front group 90° downward	

The pulses of overrun/underrun must be within the standards after the lenses have reciprocated five times (“5/5TIME (S).” in ① of the image).

Standards RATIO (1) is 40% or less for Df1~Df6 ——— ② of the image
(Occurrence ratio of 7 ~18 pulses)

RATIO (2) is 10% or less for Df1~Df6 ——— ③ of the image
(Occurrence ratio of 12 ~18 pulses)

Occurrence of 19 or more pulses is zero for Df1 ~Df6 — ④ and ⑤ of the image
(It is malfunction if there is only one occurrence.)

※ “Df1 ~Df6” shows the lens driving amount.

(4) Image of “lens servo time”

TYPE OF LENS : AF-S NIKKOR 80-200mm/2.8D		CPU VERSION : 5.04.02
INSPECTION OF LENS SERVO TIME.		

SERVO AMOUNT.	STANDARD.	
1. [Df1]	35ms OR LESS.	
2. [Df2]	45ms OR LESS.	
3. [Df3]	60ms OR LESS.	
4. [Df4]	75ms OR LESS.	
5. [Df5]	95ms OR LESS.	
6. [Df6]	110ms OR LESS.	

7. DRIVE TO INFINITY.		
8. DRIVE TO CLOSE.		
SELECT A NUMBER.		
PUSH ESC KEY TO MENU.		

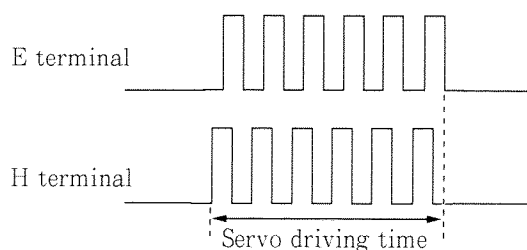
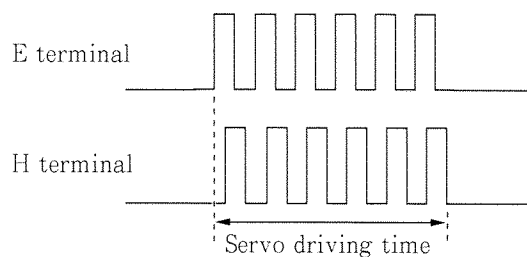
- Connect the probes of oscilloscope to E and H terminals of the AF-I communication box (J15306).

Select the servo driving amount one by one. Each of the lens servo drive time must be within the standard.

Note : If the MF ring is rotated during inspection, an error value is shown for the waveform. Don't touch the MF ring during inspection. Execute inspection for the 5 postures as mentioned below.

(Lens posture at inspection)

Lens inclination	Position of index window
Horizontal	Up, left and right
Front group 90° upward	
Front group 90° downward	

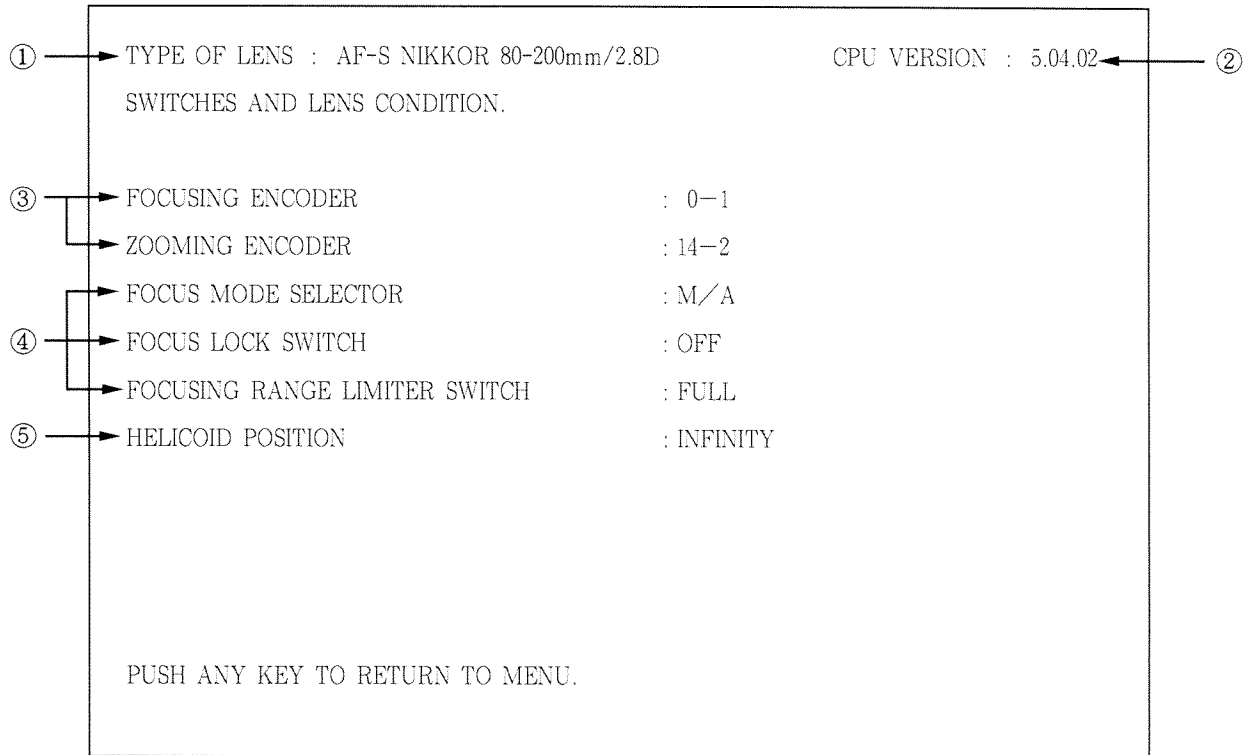


● Setting of oscilloscope

V/Div : 5 V
Coupling : DC
Time/Div : 2 0 m sec
Trigger Mode : SGL (S)
Trigger Coupling : DC
Trigger Source : CH 1

※ There are the start of going up and that of going down for the waveforms of E and H terminals.

(5) Image of “switches and lense condition”



- ① ——— Shows the type of lens.
- ② ——— Shows the version of CPU in the lens.
- ③ ——— Shows the signal of the distance encoder.
 This value is changed if the MF ring is rotated while the lens drive mode selector is at M or M/A.
- ④ ——— Shows the status of switches.
- ⑤ ——— Shows the helicoid position (close, middle or infinity) according to the distance encoder signal.

- Check by using F4

CAUTION :

This check is performed only for operation. Use a personal computer if checking precision.

1. AF operation

After focusing, check the focus with a finder.

2. Focusing limit switch

The lens must be scanned at each setting.

FULL: From “∞” to “close distance”

∞-2.5m: From “∞” to 2.5m

3. Focus lock switch

Focus must be locked at all the three points and when scanning is done.

4. Focus mode switch

- ① When the M/A mode is set.

The M mode must be set when the distance scale is operated as pre-releasing.

The MF ring and distance scale must be rotated unitedly.

- ② When the M mode is set.

The AF motor must not be actuated. Focusing can be done manually.

5. Operation of glass encoder

Cover the front lens group.

When scanning the AF mode, observe with eyes and check that there is no irregular speed while scanning.

6. Communication between camera and lens

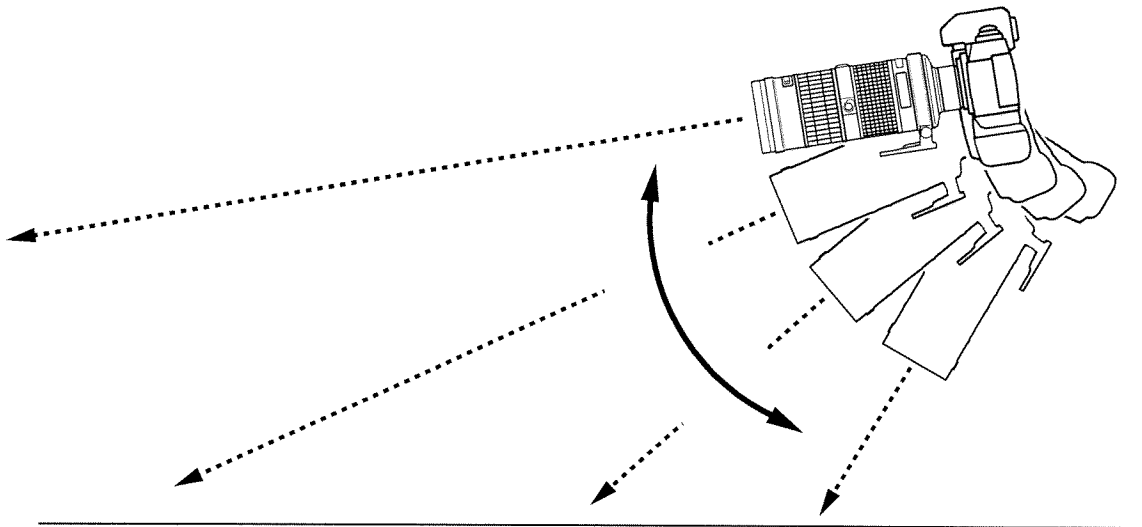
Make sure that the maximum aperture value of the lens is displayed by using SB-24, 25, 26 or MF-23. The P and S modes must operate normally.

7. Automatic actuating focus mode

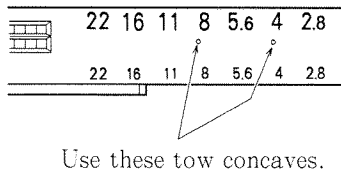
The lens must be actuated in the automatic actuating focus mode.

〈How to check〉

- ① Set the camera focus mode to “C” and the film advance mode to “CL”.
- ② Set the lens focus mode to “M/A”.
- ③ Select a desk or floor as an object and move the camera up and down slowly by pre-releasing to measure the distance from “close distance” to “ ∞ ” or from “ ∞ ” to “close distance”.
- ④ Make sure that the automatic actuating mark (▶ ◀) is ON in the finder and the lens is actuated.



MOUNTING THE COUPLING CLAW



- ① Remove the aperture ring #28.
- ② Make holes ($\phi 1.1$) at the two concaves of the aperture ring.
- ③ Mount the coupling claw.

Coupling claw	1K406—029	× 1
Screw	1K010—002—1	× 2

- ④ Assemble the components.

TOOLS

1. Measuring instruments (Main)

Tool No.	Name	Remarks
J 1 5 3 0 6	AF-I Communication box	The tool used for AF-I is used again.
J 1 5 3 0 7	AF-I Communication adapter	The tool used for AF-I is used again.
J 1 8 2 9 7 A	AF-S zoom lens inspection and adjustment software	NEC 5 inch
J 1 8 2 9 7 B	AF-S zoom lens inspection and adjustment software	NEC 3. 5 inch
J 1 8 2 9 7 C	AF-S zoom lens inspection and adjustment software	IBM 5 inch
J 1 8 2 9 7 D	AF-S zoom lens inspection and adjustment software	IBM 3. 5 inch
J 1 5 3 3 4	H8 D/A converter (F/V converter)	For adjusting the scanning speed
J 1 5 3 5 2	Communications tool	Used for inspection and adjustment for output from the MR encoder
J 1 5 3 5 3	Communications tool	For adjusting the Main FPC
J 1 5 3 5 5	Switching tool	For adjusting the Main FPC

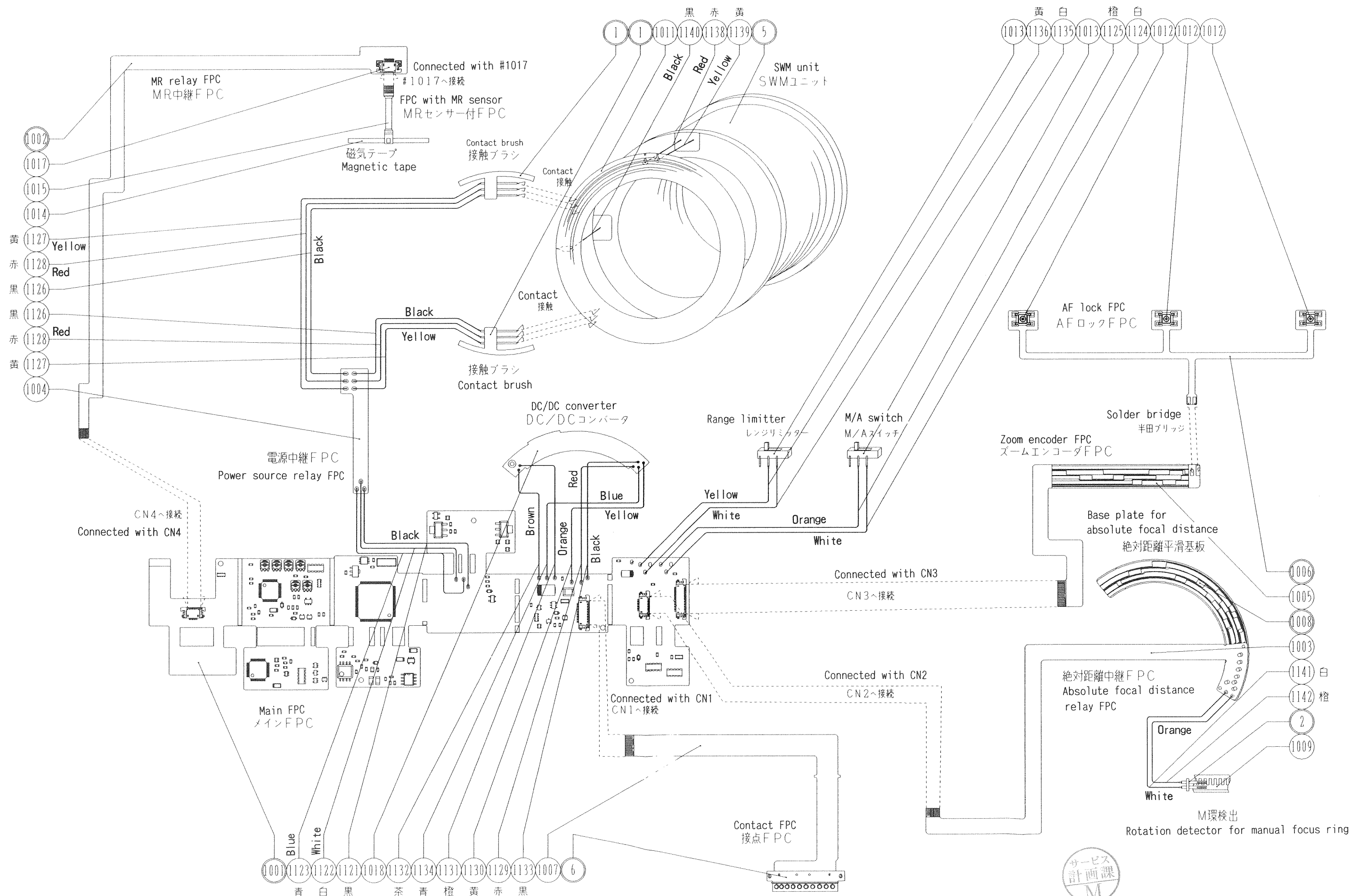
①
(Addition)

2. Hand-made instrument

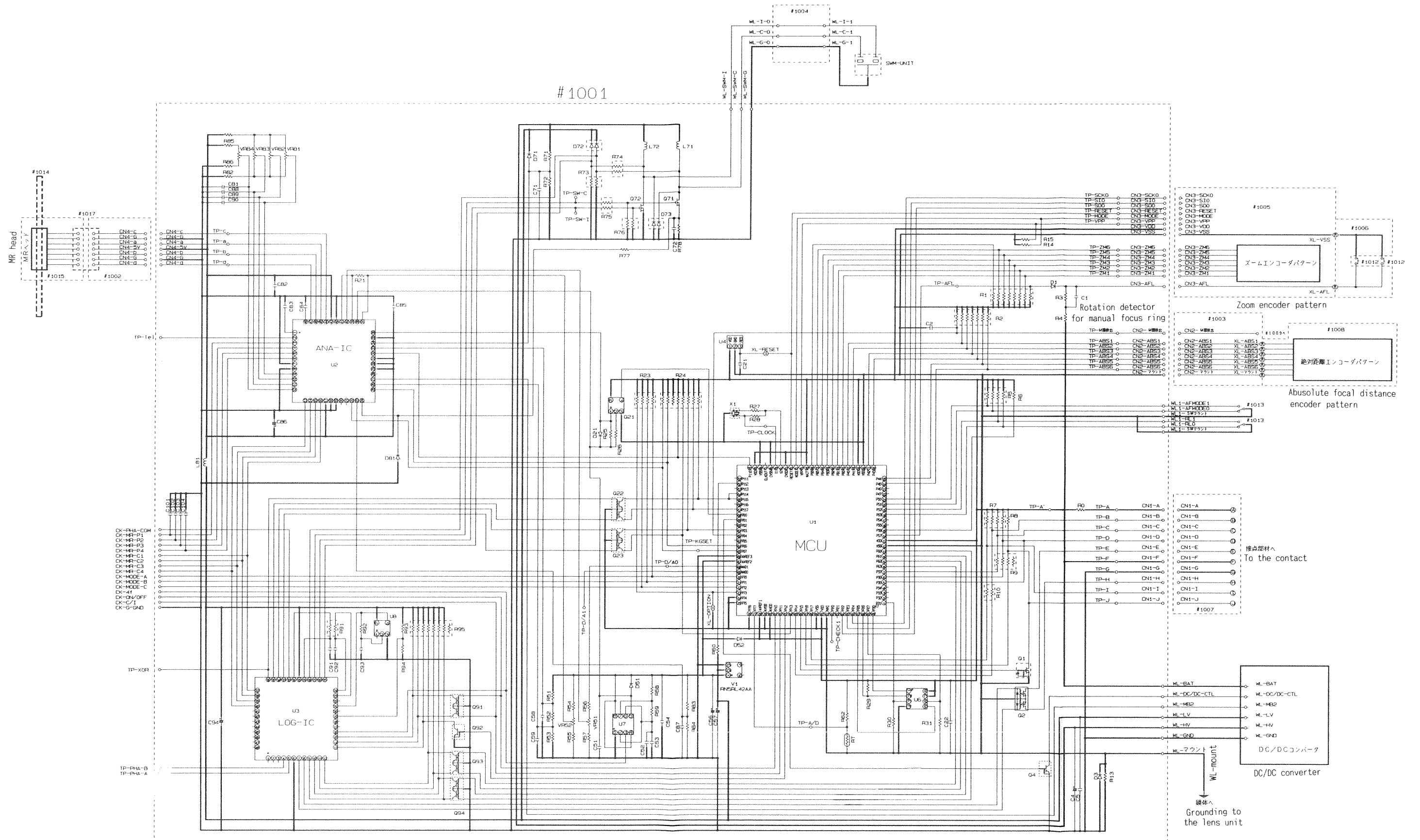
	Name	Application
Hand-made tool	SWM rotation actuating tool	The tool used for AF-S 300mm is used again.



実体配線図 WIRING FIGURE



回路図 CIRCUIT DIAGRAM



(注) R3・R4・R28・R94
C1・C52・C83・C84は未実装の事。

Additional page (追加頁)



Mar. 5, 1999

— E 2 ・ AF-S 80-200/2.8D —

AF-S 80-200/2.8D

EEPROM

1999-03-30

address	contents	CPU ver.			others
		5.05.00			
0	optional set value	0			
1	unused	—			
2	data for manufacturing processes	—			
3	value for control and adjust for motor	—			
4	data for controlling the lens	0			
5	"	0			
6	"	7 3			
7	"	2 5 0			
8	"	0			
9	"	0			
1 0	"	0			
1 1	"	0			
1 2	"	1			
1 3	unused	—			
}	}	}			
2 6	unused	—			
2 7	checksum data	—			
2 8	aberration compensation data	—			
}	}	}			
1 2 7	aberration compensation data	—			

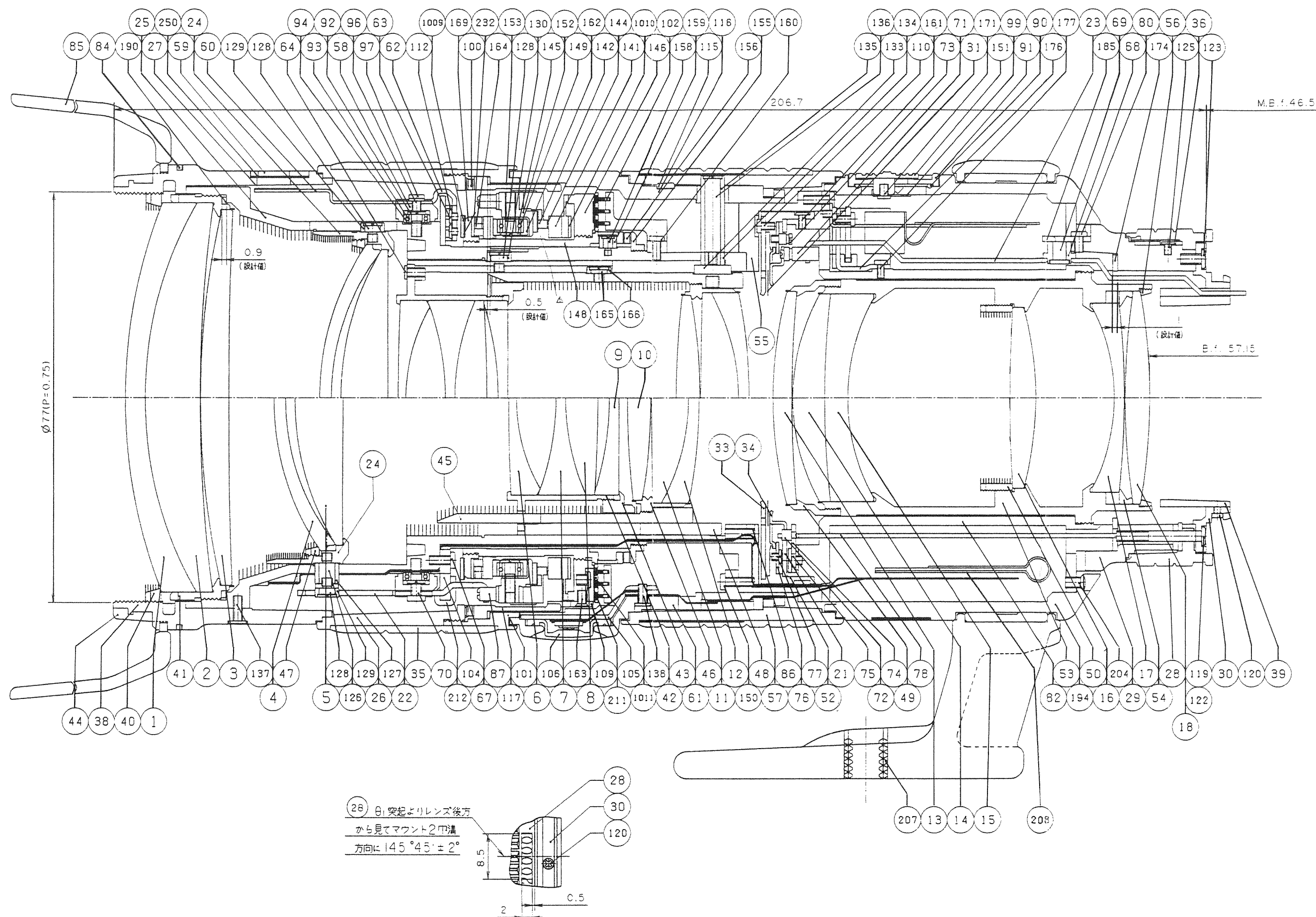
- Each 'value' explained here means the fixed value and the default value.

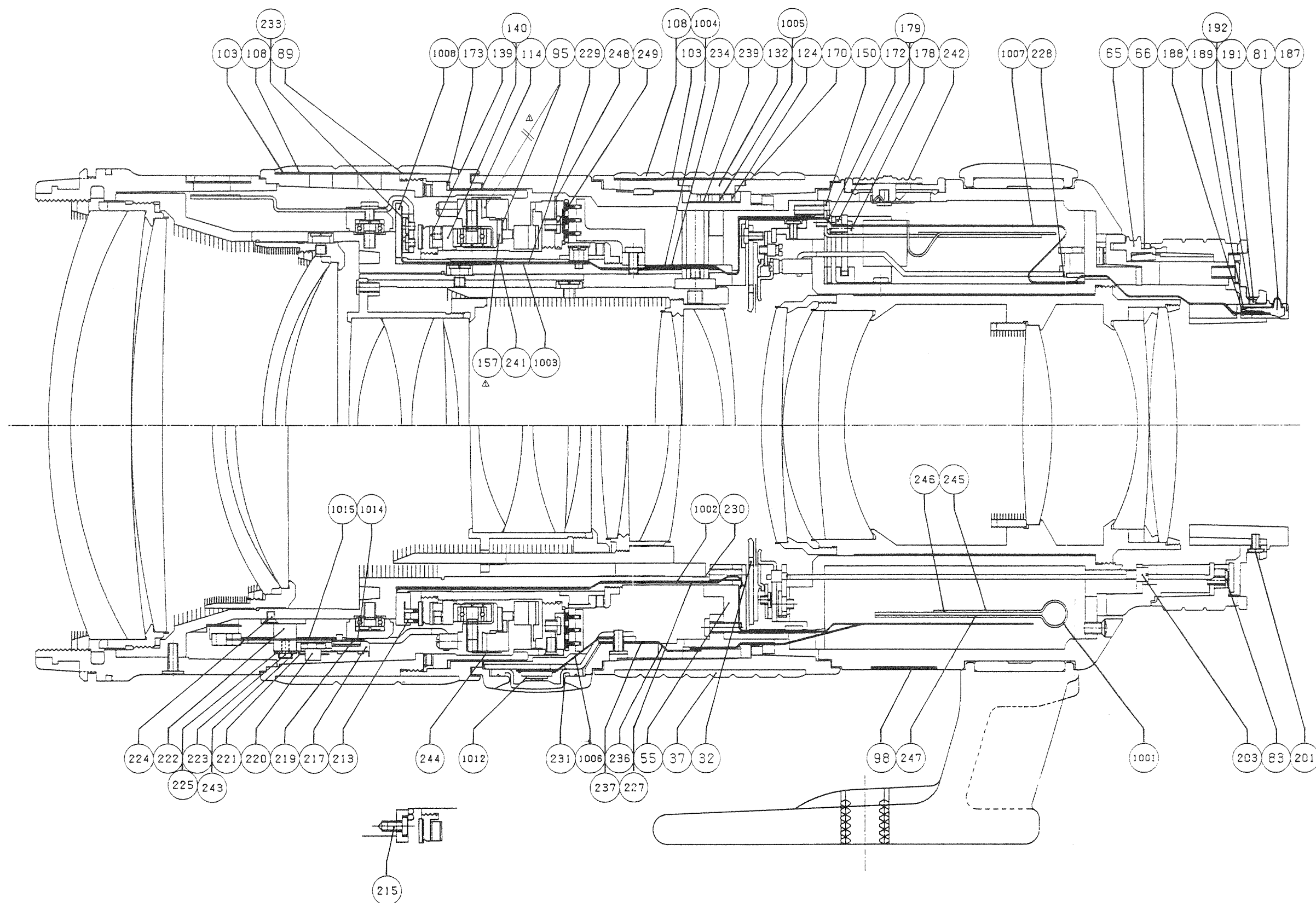
Of them, there are some changes according to the lens operational condition(s).

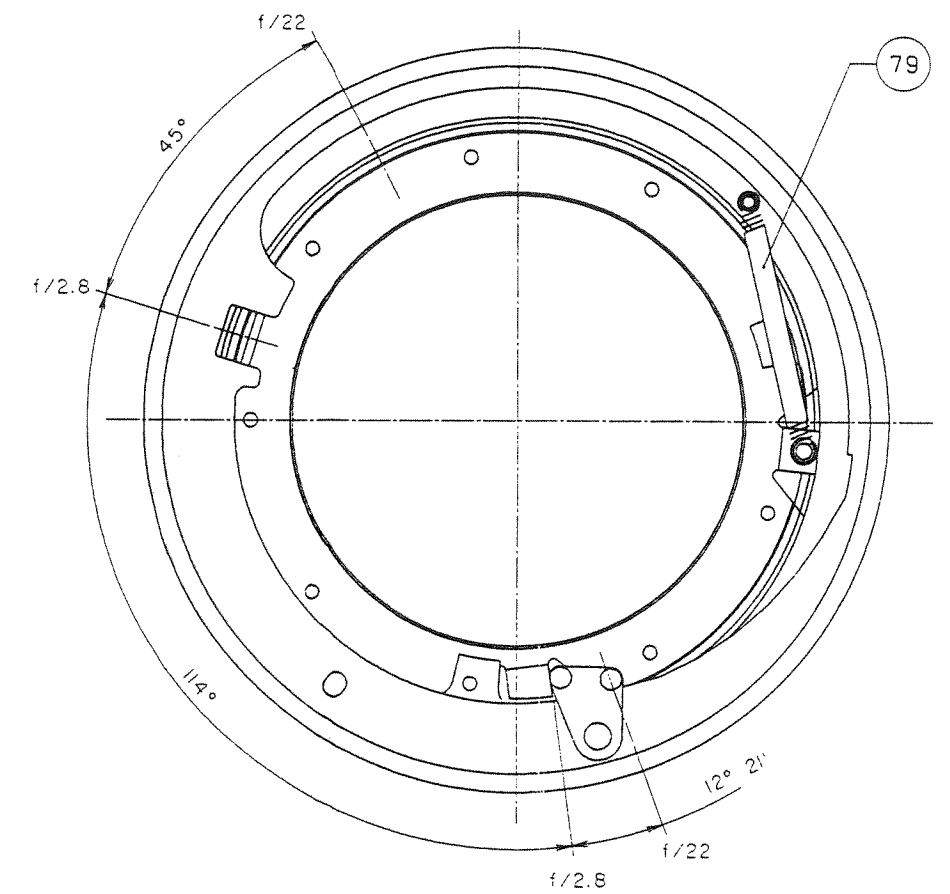
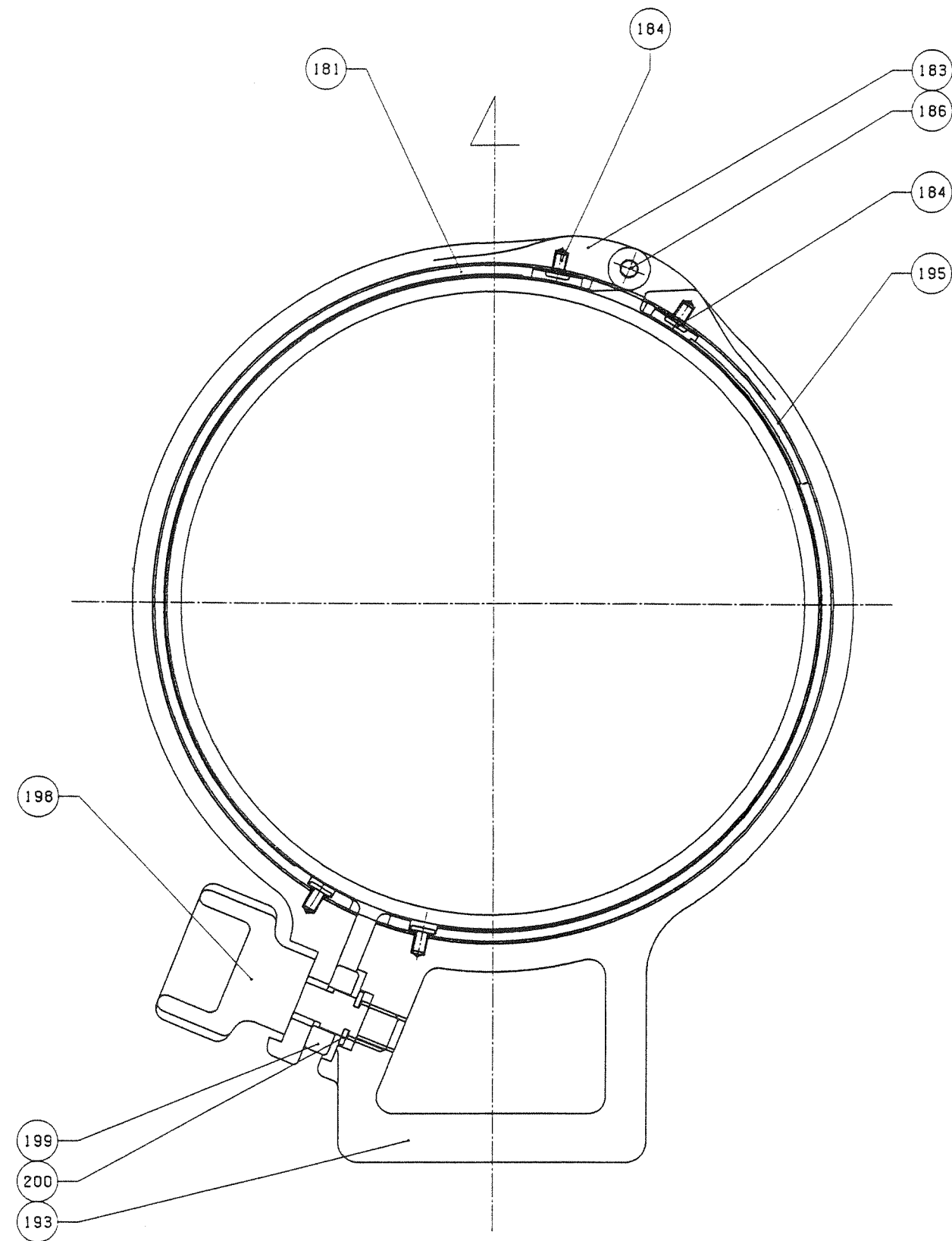
- The sign of 「-」 in the table above means a value which changes in accordance with the lens operational condition(s).



組立図 Structure of the Lens







絞り部後方より

