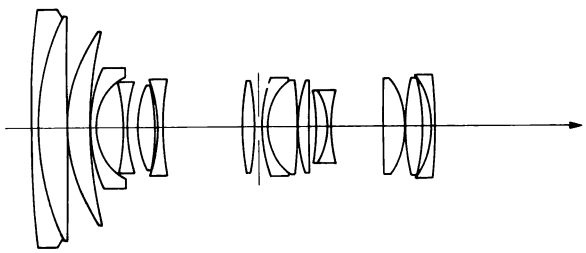
MINOLTA AF ZOOM 28-135mm F4-F4.5 (2553-100)
MINOLTA MAXXUM AF ZOOM 28-135mm F4-F4.5 (2553-600)

LENS



Construction : 16 elements in 13 groups

Type : 5-component mechanical-compensation zoom lens

Coating : Minolta Achromatic

Angle of view : 75°-18°

Lens mount : Minolta A mount

Lens signal contact : 5 contacts

Diaphragm : Automatic preset diaphragm

f No. : Maximum···WIDE 4
TELE 4.5
Minimum···WIDE 22
TELE 27
Full-stop setting···5 stops

Diaphragm blade : 7 blades

FOCUSING

Focusing : AF, FA, M

Type : Rear-component focusing

Minimum focusing distance : 1.5 m

Distance scale : $\frac{5 \quad 6 \quad 8 \quad 12 \quad 20 \quad 50 \quad \infty \text{ (ft)}}{1.5 \quad 1.7 \quad 2 \quad 2.5 \quad 3 \quad 4 \quad 7 \quad 20 \text{ (m)}}$

Infrared correction scale : (| 135 | (100) | (70) | (50) | (35) | 28)

Depth-of-field scale : No

With macro capability : 1/4× (max. magnification), "AF" impossible

ZOOMING

Type : Mechanical-compensation zoom lens, Rotary 2-ring

Zooming scale : 135 100 70 50 35 28

Zooming ratio : 4.8×

DIMENSIONS & WEIGHT

Dimensions : φ75 (max. diameter) × 109 mm (max. length)

Weight : 770 g

Filter-thread diameter : φ72 mm (P=0.75)

ACCESSORIES

Lens case (LH-1035)

Lens hood···Not supplied

AF ZOOM 28～135mm F4～4.5(22) Code No.2553-100
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I N D E X

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I N D E X

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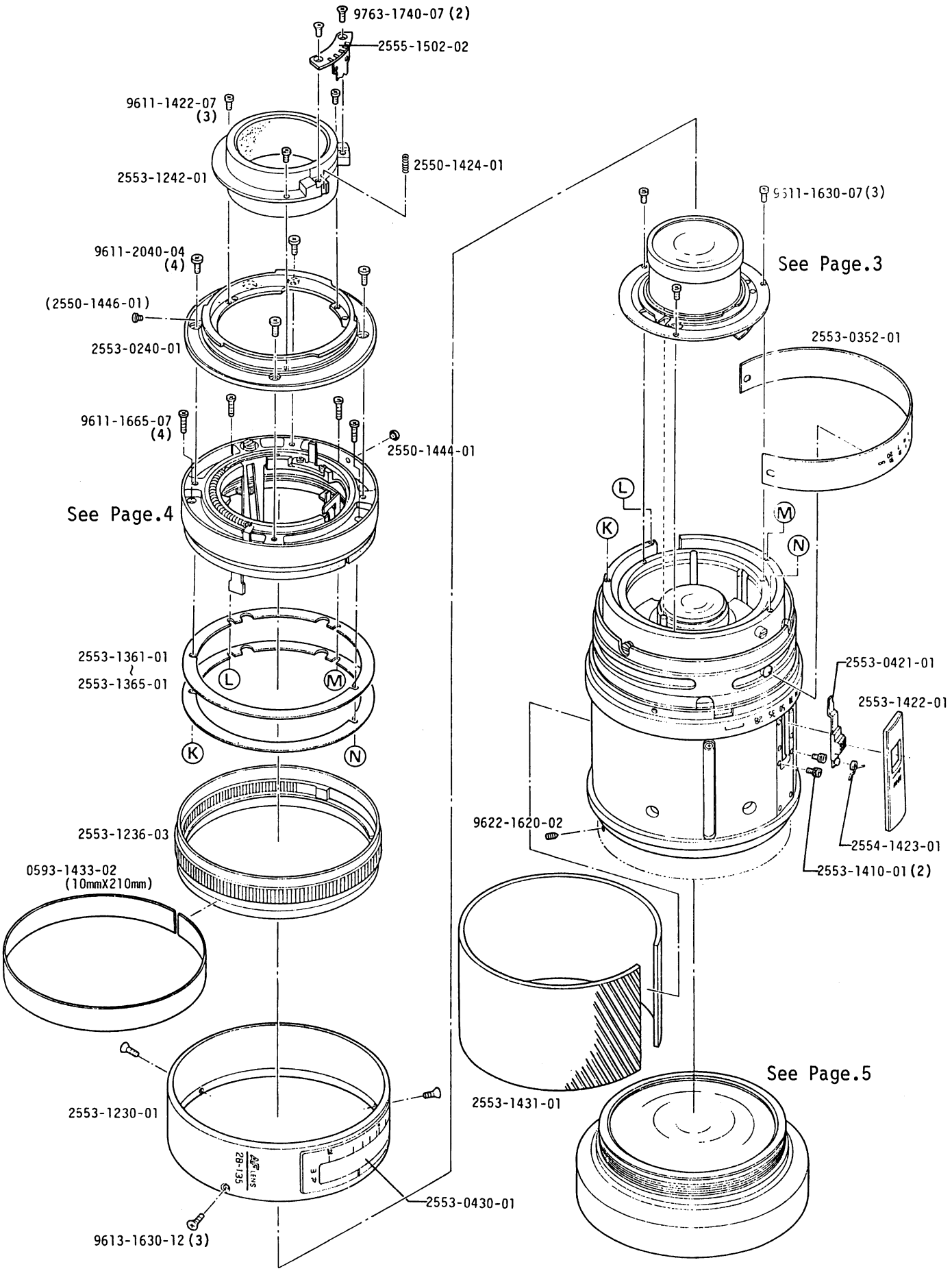

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Part No.	Part Name		Qty.
2553-0240-01	Bayonet mount set	バヨネットマウントセット	1
(2550-1446-01)	Screw	ストッパービス	1
2553-0352-01	Distance scale plate set	距離目盛板セット	1
2553-0421-01	Macro changeover lever set	マクロ切換レバーセット	1
2553-0430-01	Distance scale window set	距離表示窓セット	1
2553-1230-01	Outer ring	固定保持環	1
2553-1236-03	Focusing ring	距離リング	1
2553-1242-01	Light shield ring	遮光筒	1
2553-1361-01	Back washer - A (t=0.05)	バックワッシャーA	Some
2553-1362-01	Back washer - B (t=0.07)	バックワッシャーB	
2553-1363-01	Back washer - C (t=0.1)	バックワッシャーC	
2553-1364-01	Back washer - D (t=0.2)	バックワッシャーD	
2553-1365-01	Back washer - E (t=0.5)	バックワッシャーE	
2553-1410-01	Spring hanger - B	スプリング掛け－B	2
2553-1422-01	Macro changeover lever pressure	マクロ切換レバー押え	1
2554-1423-01	Macro spring	マクロスプリング	1
2550-1424-01	Spring	アーススプリング	1
2553-1431-01	Leather	貼皮	1
0593-1433-02	Tape - A (Per roll/30m)	補強テープA	1
2550-1444-01	Bayonet point	バヨネット標点	1
2555-1502-02	Lens contact board	信号基板	1
9611-1422-07	Phillips type screw	十字穴付なべ頭小ねじ	3
9611-1630-07	Phillips type screw	十字穴付なべ頭小ねじ	3
9611-1665-07	Phillips type screw	十字穴付なべ頭小ねじ	4
9611-2040-04	Phillips type screw	十字穴付なべ頭小ねじ	4
9613-1630-12	Phillips type screw	十字穴付半丸頭小ねじ	3
9622-1620-02	Screw	とがり先止めねじ	1
9763-1740-07	Tap tite screw	十字穴付半丸頭タップタイトねじ	2

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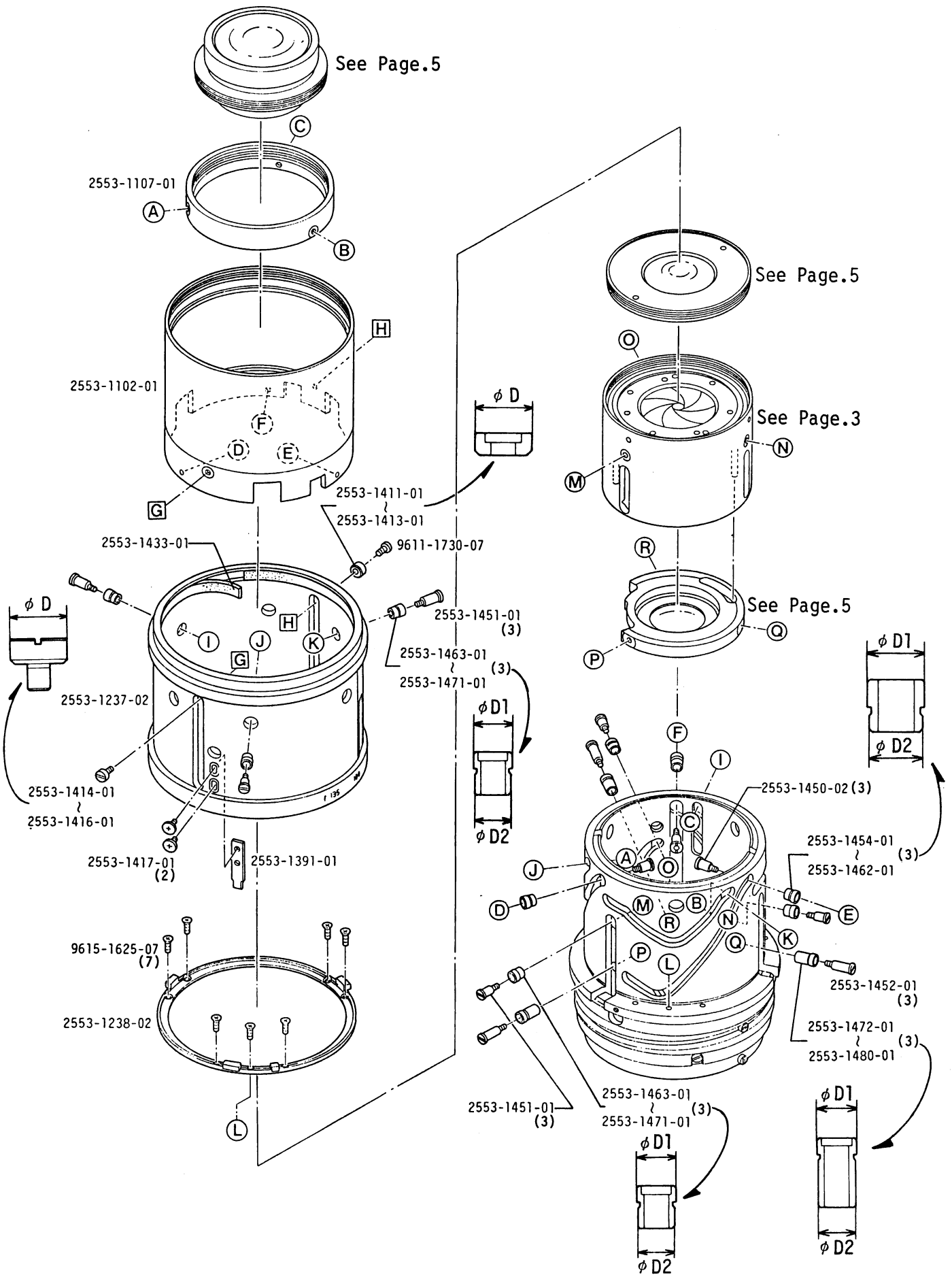

Part No.	Part Name		Qty.
2553-1102-01	1st. moving barrel	第1移動枠	1
2553-1107-01	2nd. moving barrel	第2移動枠	1
2553-1237-02	Zoom ring	ズームリング	1
2553-1238-02	Zoom ring guide	ズーム押え環	1
2553-1391-01	Zoom stopper	ズームストッパー	1
2553-1411-01	Zoom ring guide roller - A (D=φ4.03)	ズームリング案内ローラーA	1
2553-1412-01	Zoom ring guide roller - B (D=φ4.02)	ズームリング案内ローラーB	
2553-1413-01	Zoom ring guide roller - C (D=φ4.01)	ズームリング案内ローラーC	
2553-1414-01	Zoom ring guide pin - A (D=φ4.03)	ズームリング案内ピンA	1
2553-1415-01	Zoom ring guide pin - B (D=φ4.02)	ズームリング案内ピンB	
2553-1416-01	Zoom ring guide pin - C (D=φ4.01)	ズームリング案内ピンC	
2553-1417-01	Screw	ズームストッパー取付ビス	2
2553-1433-01	Friction cloth - B	摩擦布B	1
2553-1450-02	1st. guide pin	第1案内ピン	3
2553-1451-01	2nd. & 3rd. guide pin	第2,3案内ピン	6
2553-1452-01	4th. guide pin	第4案内ピン	3
2553-1454-01	1st. guide roller - A (D1=φ4.03,D2=φ3.73)	第1案内ローラーA	3
2553-1455-01	1st. guide roller - B (D1=φ4.03,D2=φ3.72)	第1案内ローラーB	
2553-1456-01	1st. guide roller - C (D1=φ4.03,D2=φ3.71)	第1案内ローラーC	
2553-1457-01	1st. guide roller - D (D1=φ4.02,D2=φ3.73)	第1案内ローラーD	
2553-1458-01	1st. guide roller - E (D1=φ4.02,D2=φ3.72)	第1案内ローラーE	
2553-1459-01	1st. guide roller - F (D1=φ4.02,D2=φ3.71)	第1案内ローラーF	
2553-1460-01	1st. guide roller - G (D1=φ4.01,D2=φ3.73)	第1案内ローラーG	
2553-1461-01	1st. guide roller - H (D1=φ4.01,D2=φ3.72)	第1案内ローラーH	
2553-1462-01	1st. guide roller - I (D1=φ4.01,D2=φ3.71)	第1案内ローラーI	
2553-1463-01	2nd. & 3rd. guide roller - A (D1=φ4.03,D2=φ3.73)	第2,3案内ローラーA	6
2553-1464-01	2nd. & 3rd. guide roller - B (D1=φ4.03,D2=φ3.72)	第2,3案内ローラーB	
2553-1465-01	2nd. & 3rd. guide roller - C (D1=φ4.03,D2=φ3.71)	第2,3案内ローラーC	
2553-1466-01	2nd. & 3rd. guide roller - D (D1=φ4.02,D2=φ3.73)	第2,3案内ローラーD	
2553-1467-01	2nd. & 3rd. guide roller - E (D1=φ4.02,D2=φ3.72)	第2,3案内ローラーE	
2553-1468-01	2nd. & 3rd. guide roller - F (D1=φ4.02,D2=φ3.71)	第2,3案内ローラーF	
2553-1469-01	2nd. & 3rd. guide roller - G (D1=φ4.01,D2=φ3.73)	第2,3案内ローラーG	
2553-1470-01	2nd. & 3rd. guide roller - H (D1=φ4.01,D2=φ3.72)	第2,3案内ローラーH	
2553-1471-01	2nd. & 3rd. guide roller - I (D1=φ4.01,D2=φ3.71)	第2,3案内ローラーI	
2553-1472-01	4th. guide roller - A (D1=φ4.03,D2=φ3.73)	第4案内ローラーA	3
2553-1473-01	4th. guide roller - B (D1=φ4.03,D2=φ3.72)	第4案内ローラーB	
2553-1474-01	4th. guide roller - C (D1=φ4.03,D2=φ3.71)	第4案内ローラーC	
2553-1475-01	4th. guide roller - D (D1=φ4.02,D2=φ3.73)	第4案内ローラーD	
2553-1476-01	4th. guide roller - E (D1=φ4.02,D2=φ3.72)	第4案内ローラーE	
2553-1477-01	4th. guide roller - F (D1=φ4.02,D2=φ3.71)	第4案内ローラーF	
2553-1478-01	4th. guide roller - G (D1=φ4.01,D2=φ3.73)	第4案内ローラーG	
2553-1479-01	4th. guide roller - H (D1=φ4.01,D2=φ3.72)	第4案内ローラーH	
2553-1480-01	4th. guide roller - I (D1=φ4.01,D2=φ3.71)	第4案内ローラーI	
9611-1730-07	Phillips type screw	十字穴付なべ頭小ねじ	1
9615-1625-07	Phillips type screw	十字穴付さら頭小ねじ	7

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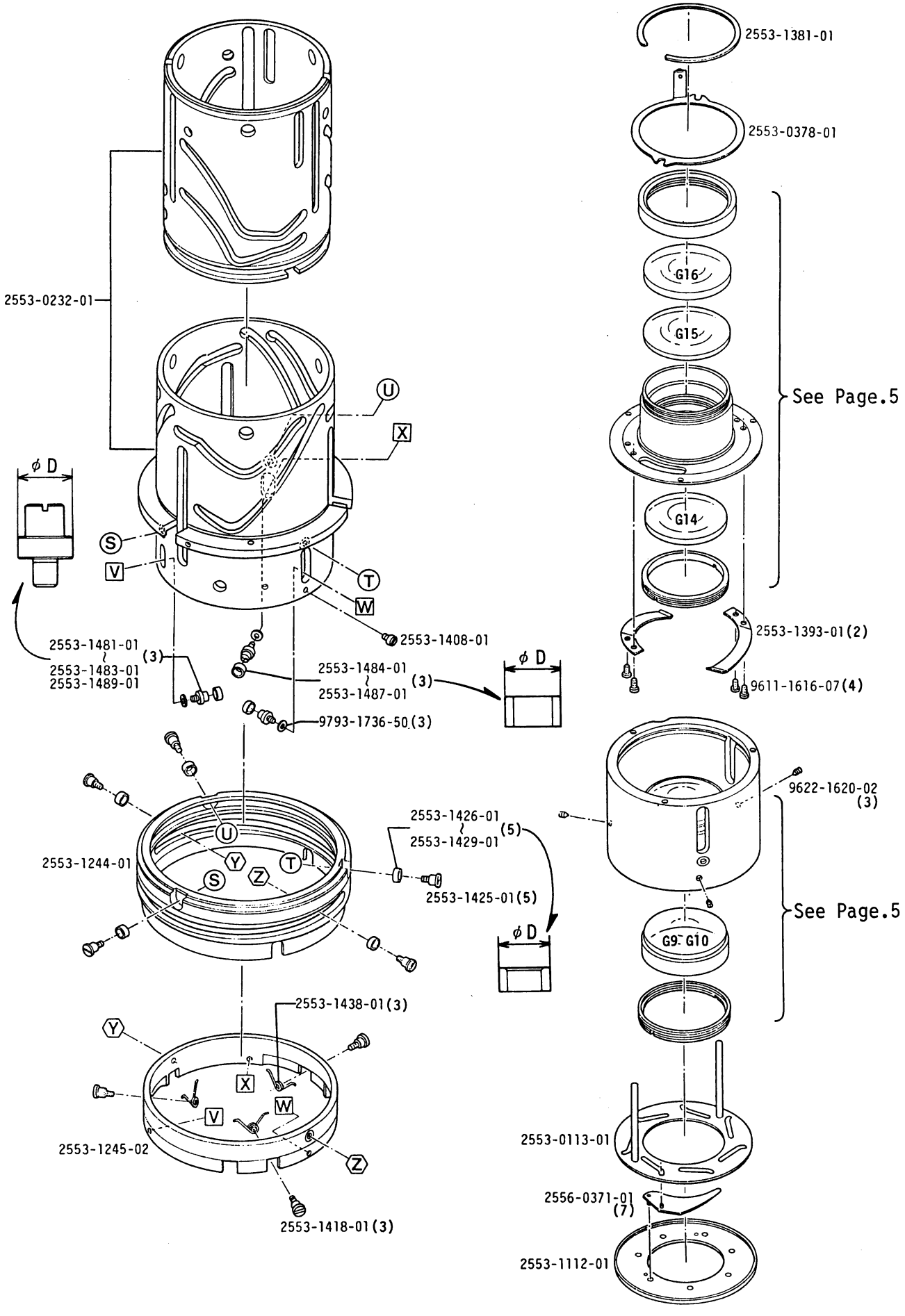

Part No.	Part Name		Qty.
2553-0113-01	Diaphragm operation plate set	絞り操作板セット	1
2553-0232-01	Zoom cam barrel set	ズームカム環セット	1
2556-0371-01	Diaphragm blade set	絞り羽根セット	7
2553-0378-01	Diaphragm operation lever set	絞り操作レバーセット	1
2553-1112-01	Diaphragm pressure ring	絞り押え環	1
2553-1244-01	Lead groove barrel	リード溝環	1
2553-1245-02	Connecting barrel	直進連動環	1
2553-1381-01	Stopper ring	絞り操作レバー抜け止めリング	1
2553-1393-01	Plate spring	移動枠片寄せスプリング	2
2553-1408-01	Focusing stopper	フォーカスストッパー	1
2553-1418-01	Pin	スプリング受けピン	3
2553-1425-01	Lead groove barrel pin	リード溝環ピン	5
2553-1426-01	Lead groove barrel roller - A(D=φ3.63)	リード溝環ローラーA	5
2553-1427-01	Lead groove barrel roller - B(D=φ3.62)	リード溝環ローラーB	
2553-1428-01	Lead groove barrel roller - C(D=φ3.61)	リード溝環ローラーC	
2553-1429-01	Lead groove barrel roller - D(D=φ3.60)	リード溝環ローラーD	
2553-1438-01	Focus spring	フォーカススプリング	3
2553-1481-01	Focus guide pin - A(D=φ4.03)	フォーカス案内ピンA	3
2553-1482-01	Focus guide pin - B(D=φ4.02)	フォーカス案内ピンB	
2553-1483-01	Focus guide pin - C(D=φ4.01)	フォーカス案内ピンC	
2553-1484-01	Focus roller - A(D=φ3.81)	フォーカスローラーA	3
2553-1485-01	Focus roller - B(D=φ3.80)	フォーカスローラーB	
2553-1486-01	Focus roller - C(D=φ3.79)	フォーカスローラーC	
2553-1487-01	Focus roller - D(D=φ3.78)	フォーカスローラーD	
2553-1489-01	Focus guide pin - D(D=φ3.95)	フォーカス案内ピンD	0 ～ 3
9611-1616-07	Phillips type screw	十字穴付なべ頭小ねじ	4
9622-1620-02	Screw	とがり先止めねじ	3
9793-1736-50	Washer	薄ワッシャー	3

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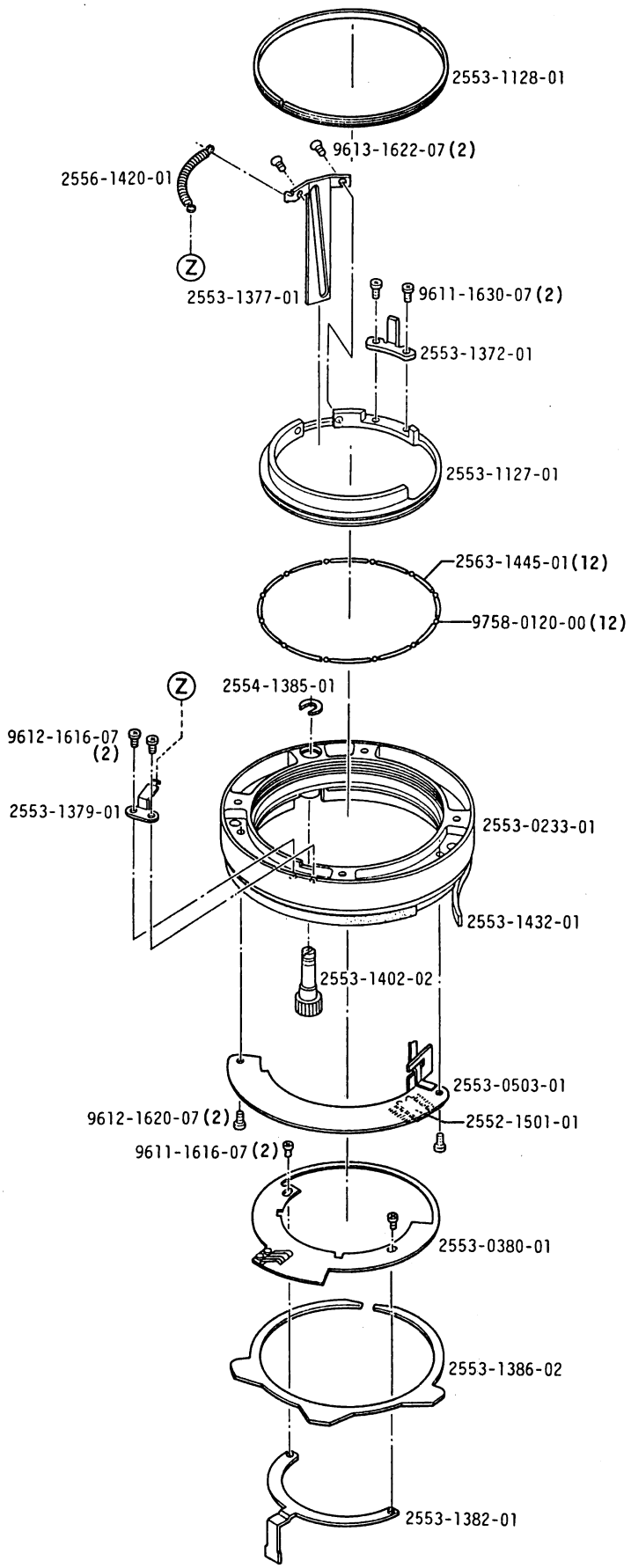

Part No.	Part Name		Qty.
2553-0233-01	Outer barrel set	外筒セット	1
2553-0380-01	Brush plate set	ブラシ板セット	1
2553-0503-01	Flexible PC board set	フレキセット	1
2553-1127-01	Preset ring	プリセットリング	1
2553-1128-01	Preset ring pressure	プリセットリング押え	1
2553-1372-01	Preset lever	プリセットレバー	1
2553-1377-01	Cam plate	カム板	1
2553-1379-01	Spring hanger - A	スプリング掛け－A	1
2553-1382-01	Brush connecting plate	ブラシ連動板	1
2554-1385-01	C - washer	Cワッシャー	1
2553-1386-02	Brush pressure	ブラシ板押え	1
2553-1402-02	Coupler	カプラー	1
2556-1420-01	Main spring	メインスプリング	1
2553-1432-01	Friction cloth - A	摩擦布－A	1
2563-1445-01	Spacer	スペーサー	12
2552-1501-01	IC(TOSHIBA ML00C)	IC	1
9611-1616-07	Phillips type screw	十字穴付なべ頭小ねじ	2
9611-1630-07	Phillips type screw	十字穴付なべ頭小ねじ	2
9612-1616-07	Phillips type screw	十字穴付なべ頭小ねじ	2
9612-1620-07	Phillips type screw	十字穴付なべ頭小ねじ	2
9613-1622-07	Phillips type screw	十字穴付半丸頭小ねじ	2
9758-0120-00	Steel ball	スチールボール	12

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■ When repairing following parts, must be checked resolving power by projection.

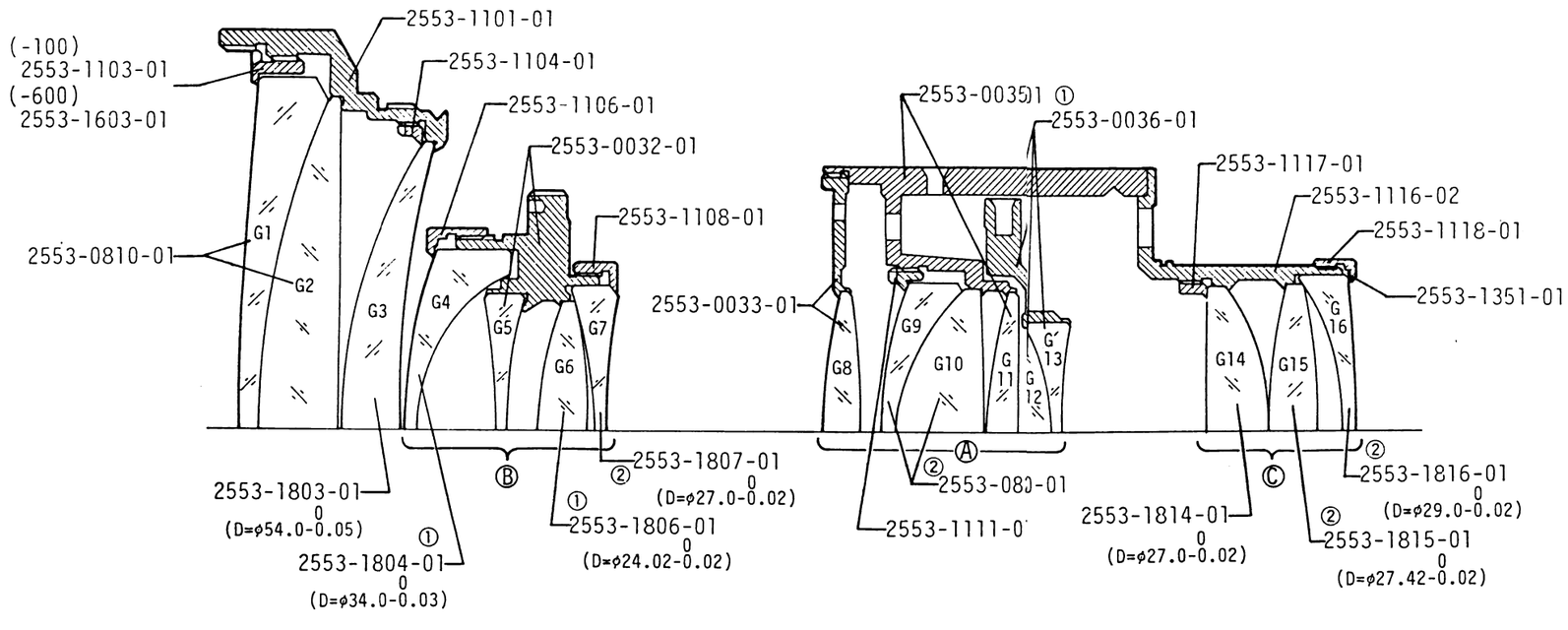
①: The influential lens element in the lens performance. (Number shows in order.)

Ⓐ: The influential lens group in the lens performance. (Influence: In alphabetical order)

■下記部品を修理した場合は、必ず投影能力を確認して下さい。

①：レンズ性能によく影響するレンズ。(数字は順位を示す)

Ⓐ：レンズ性能によく影響するレンズ。(影響度：アルファベット順)



Part No.	Part Name		Qty.
2553-0032-01	2nd. lens barrel set	第2玉枠セット	1
2553-0033-01	G8 lens barrel set	G8玉枠セット	1
2553-0035-01	Inner barrel set	内筒セット	1
2553-0036-01	4th. lens barrel set	第4玉枠セット	1
2553-0810-01	G1,G2 set	G1,G2セット	1
2553-0820-01	G9,G10 set	G9,G10セット	1
2553-1101-01	1st. lens barrel	第1玉枠	1
2553-1103-01	G1,G2 pressure (-100)	G1,G2押え	1
2553-1104-01	G3 pressure ring	G3押え	1
2553-1106-01	G4 pressure ring	G4押え	1
2553-1108-01	G6,G7 pressure ring	G6,G7押え	1
2553-1111-01	G9,G10 pressure ring	G9,G10押え	1
2553-1116-02	5th. lens barrel	第5玉枠	1
2553-1117-01	G14 pressure ring	G14押え	1
2553-1118-01	G15,G16 pressure ring	G15,G16押え	1
2553-1351-01	Washer	G16すべりワッシャー	1
2553-1603-01	G1,G2 pressure (-600)	G1,G2押え	1
2553-1803-01	Lens - G3	レンズG3	1
2553-1804-01	Lens - G4	レンズG4	1
2553-1806-01	Lens - G6	レンズG6	1
2553-1807-01	Lens - G7	レンズG7	1
2553-1814-01	Lens - G14	レンズG14	1
2553-1815-01	Lens - G15	レンズG15	1
2553-1816-01	Lens - G16	レンズG16	1

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REPAIR GUIDE

■ The contents of this manual are in accordance with the assembling procedure. Therefore, follow the reverse procedure when disassembling.

—Description of marks used—

[B] : Adhesive
[S] : Solvent
[A] : Anti-diffusion compound
[G] : Lubricant
[T] : Tool
■ : Point of assembling and general caution

■ Assembling and adjusting procedure

■ Precautions

- Since this lens uses many resin parts, keep the following in mind when assembling and adjusting.
  ○ Use Flonsolve or alcohol when cleaning.
  Never use the thinner, ketone or ether.
- Since MOS-IC is used in this lens, it is necessary to take special precautions about static electricity.
  When performing repairs, use the conductive mat without fail, as shown.

Code No. 2553-100
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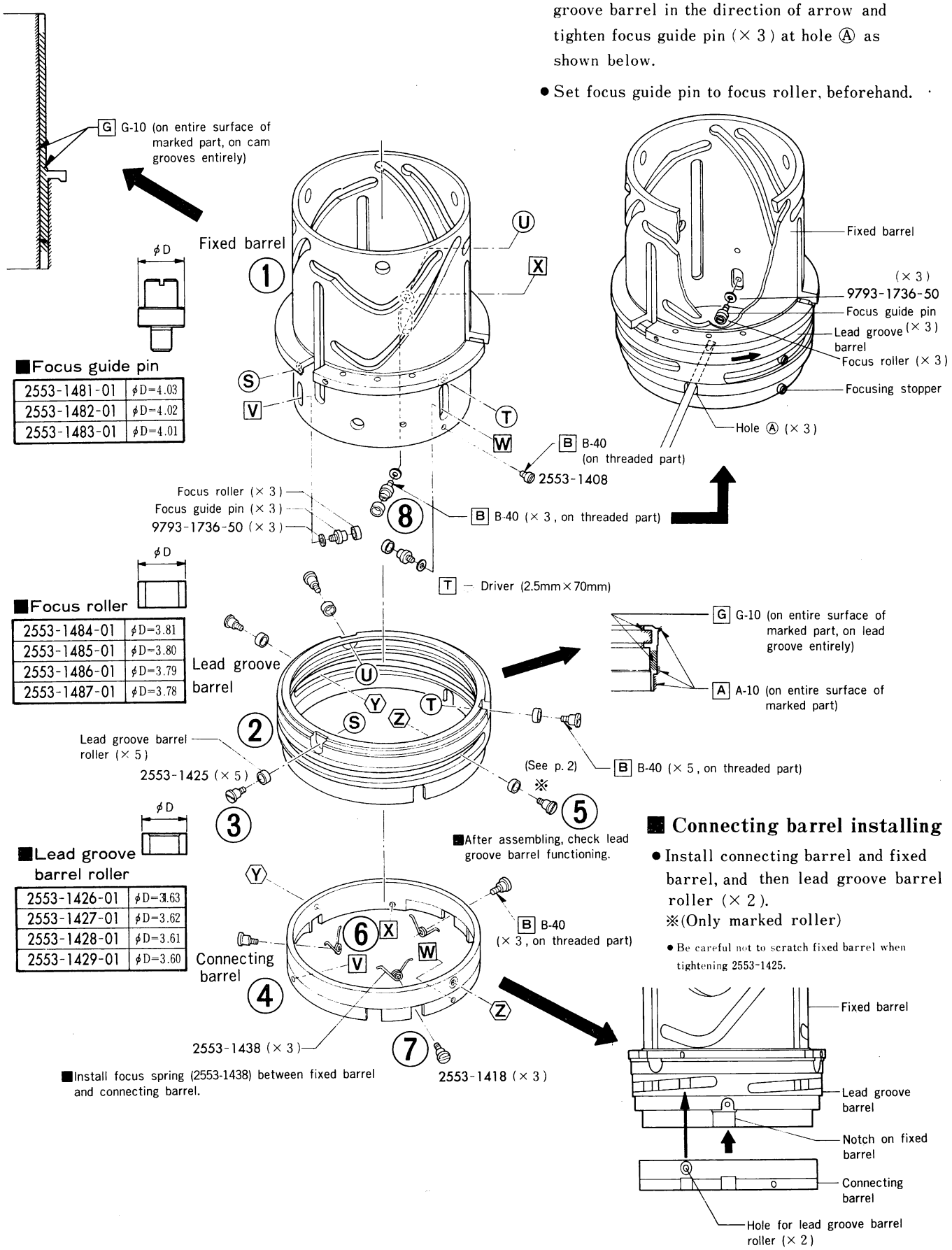
1 Fixed barrel, Lead groove barrel, Connecting barrel, Zoom cam barrel

■Assemble the parts in the order of ①–⑨.



■Focus guide pin

2553-1481-01	φD=4.03
2553-1482-01	φD=4.02
2553-1483-01	φD=4.01

■Focus roller

2553-1484-01	φD=3.81
2553-1485-01	φD=3.80
2553-1486-01	φD=3.79
2553-1487-01	φD=3.78

■Lead groove barrel roller

2553-1426-01	φD=3.63
2553-1427-01	φD=3.62
2553-1428-01	φD=3.61
2553-1429-01	φD=3.60

■Install focus spring (2553-1438) between fixed barrel and connecting barrel.

■After assembling, check lead groove barrel functioning.

■ Focus guide pin installing

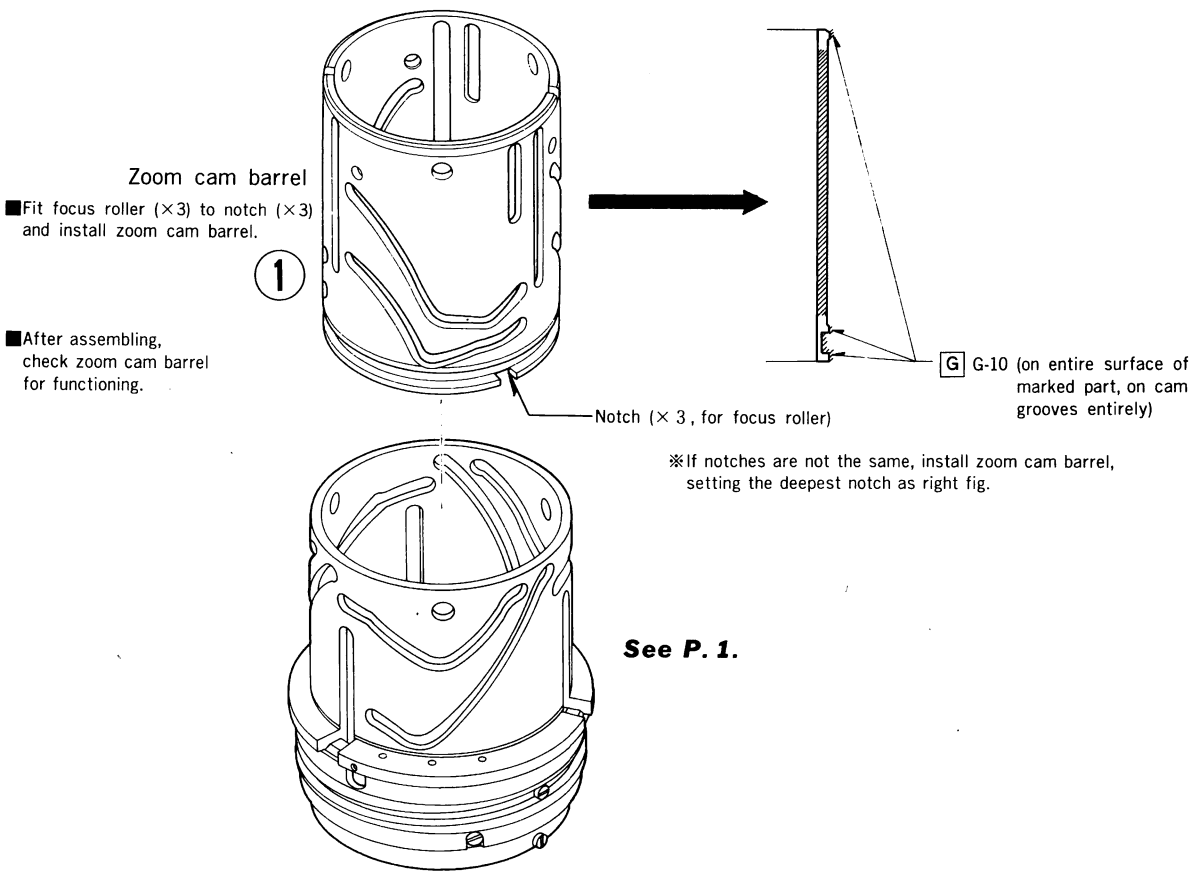
- After installing connecting barrel, turn lead groove barrel in the direction of arrow and tighten focus guide pin (× 3) at hole Ⓐ as shown below.
- Set focus guide pin to focus roller, beforehand.

■ Connecting barrel installing

- Install connecting barrel and fixed barrel, and then lead groove barrel roller (× 2).
  ※(Only marked roller)
- Be careful not to scratch fixed barrel when tightening 2553-1425.

2 Zoom cam barrel

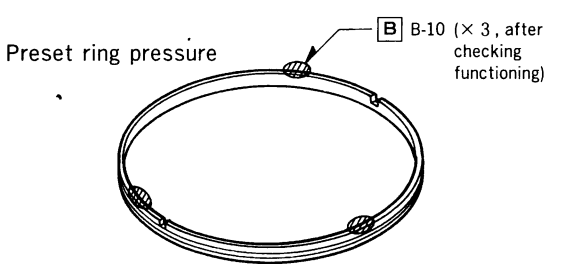
■Assemble the parts in the order of ①—②.

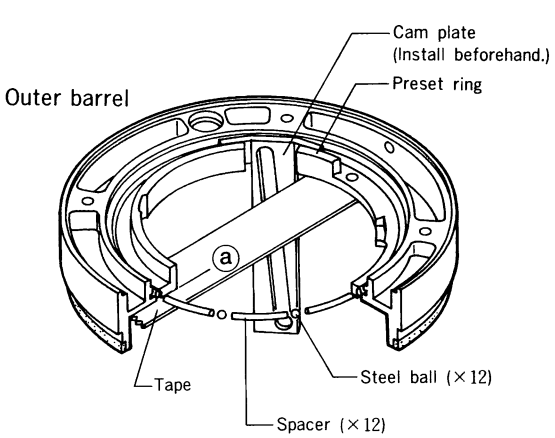


※If notches are not the same, install zoom cam barrel, setting the deepest notch as right fig.

See P. 1.

■ Outer barrel, Preset ring assembling





① Adhere tape (Scotch tape etc.) to preset ring.

② Set preset ring in the center of fixed barrel. Hold preset ring and level up to ⓐ position as shown left.
(For easier handling, put parts on your hand.)

③ Add tape to stabilize preset ring.
Install spacer and steel ball alternately.

④ Install and turn preset ring pressure to stop position. (Pay attention to adhesive on preset ring pressure.)

⑤ Remove tape. Loosen preset ring pressure slightly (turn back about 20mm) for preset ring moving free.

⑥ Apply B-10 (×2) on preset ring pressure.

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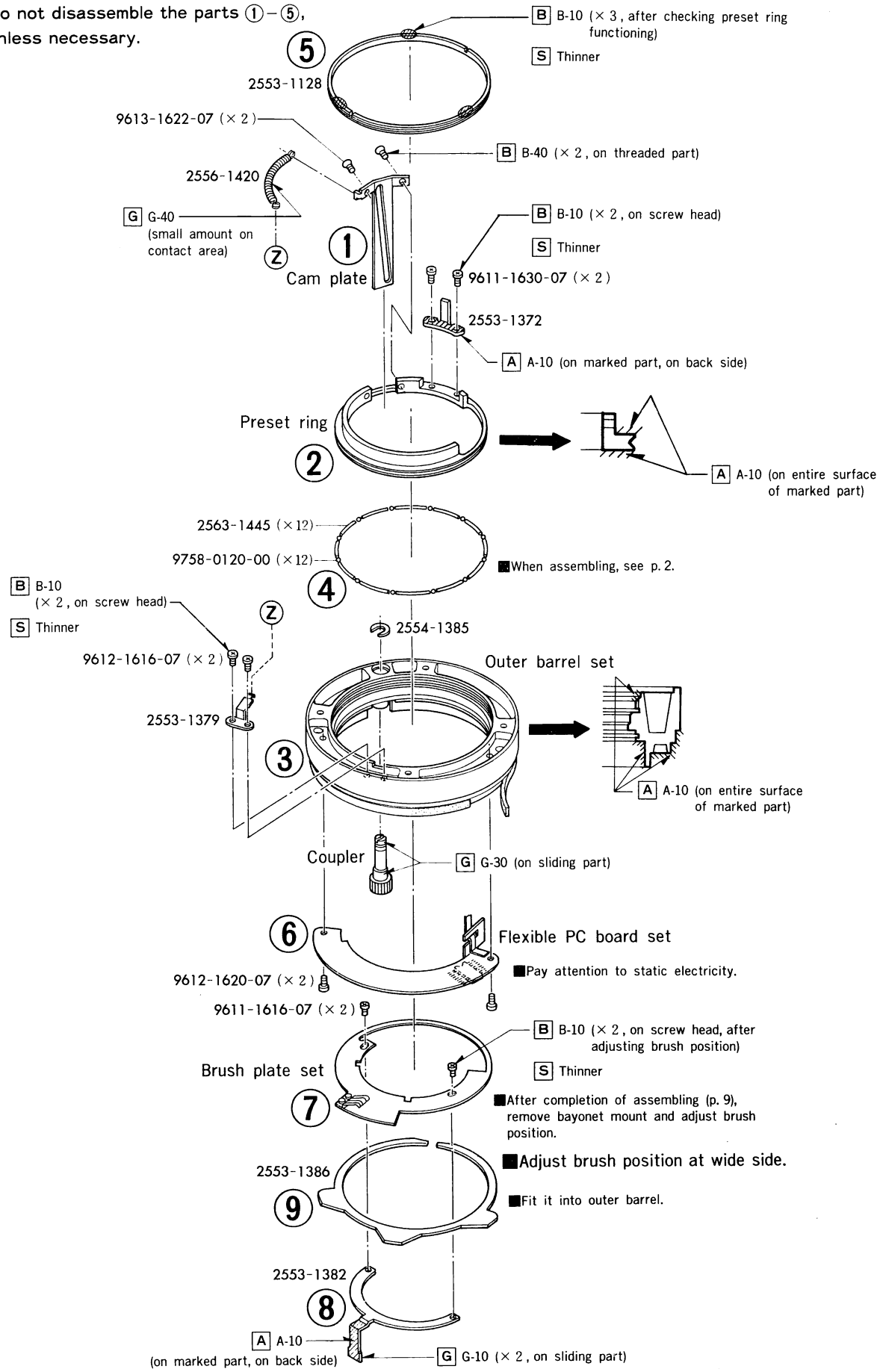
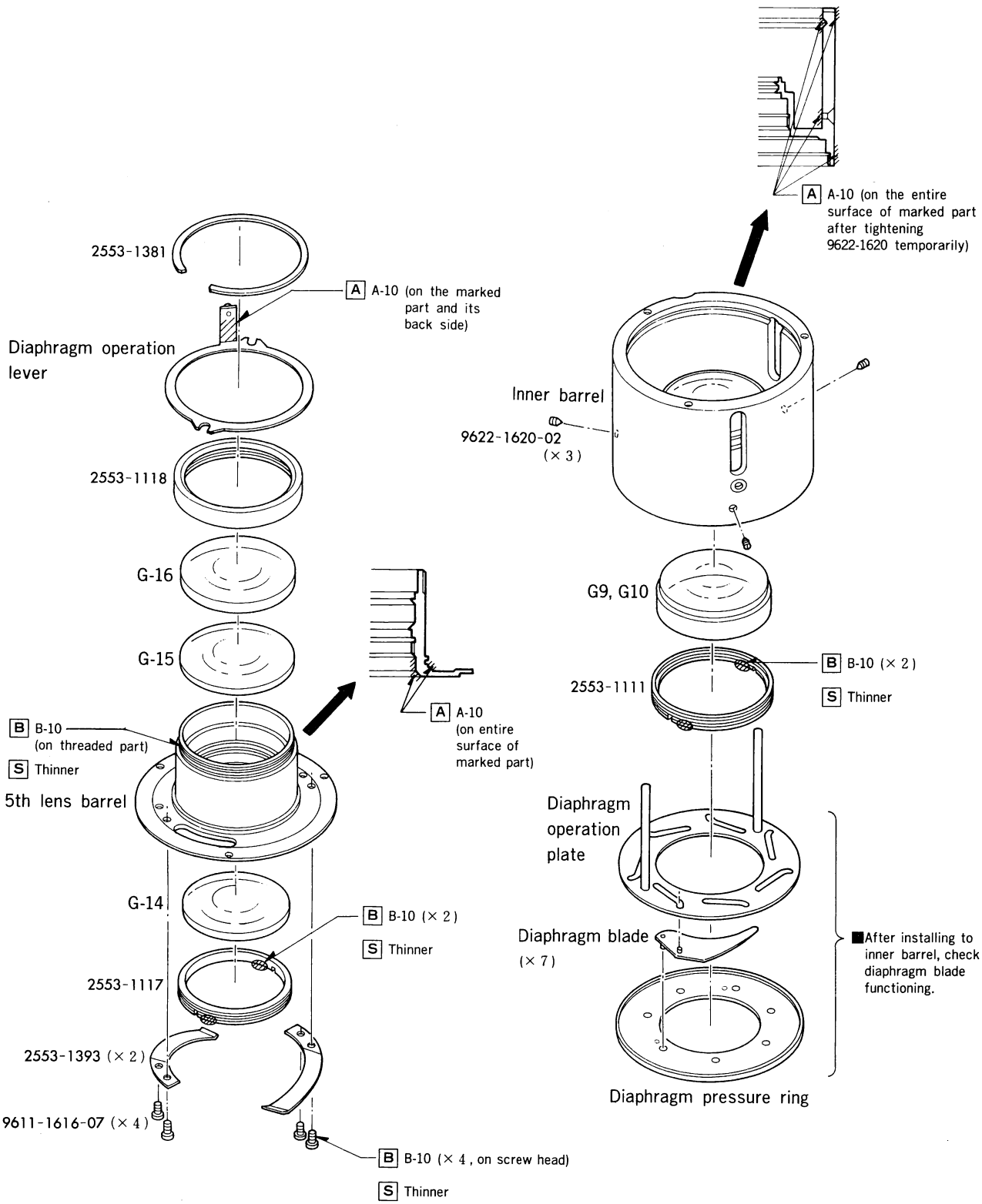
3 Cam plate, Preset ring, Outer barrel set, Coupler, Flexible PC board set, Brush plate set

■Assemble the parts in the order of ①–⑨.
■Do not disassemble the parts ①–⑤, unless necessary.



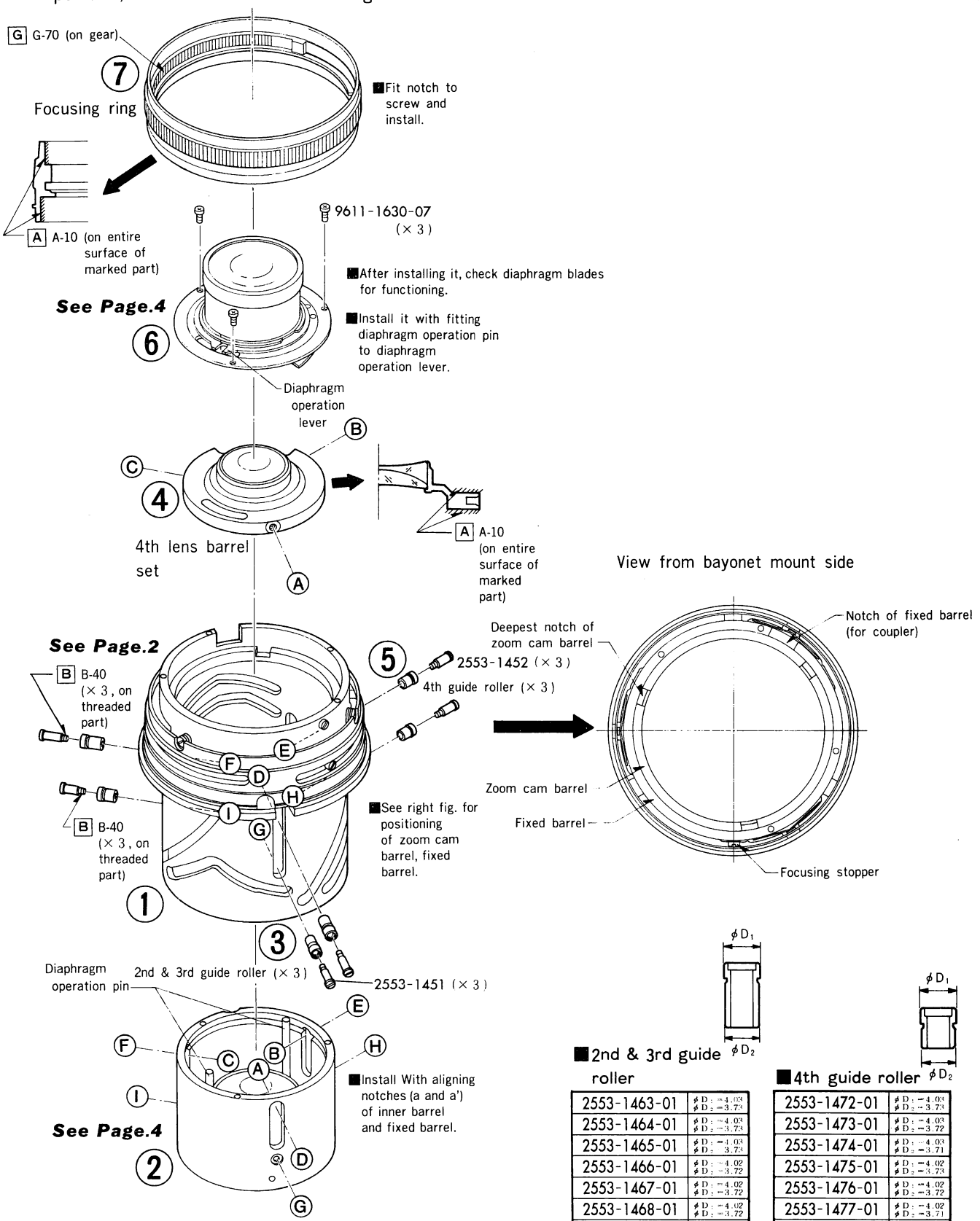
4 5th lens barrel, Diaphragm operation lever, Inner barrel, Diaphragm operation plate, Diaphragm blade, Diaphragm pressure ring

■ Assemble the parts as fig. below.



5 4th lens barrel set, Focusing ring

■Assemble the parts in the order of ①—⑦.
■After assembling the parts ①—⑤, turn zoom cam barrel clockwise (see from subject side) to stop position, and then continue assembling.



■2nd & 3rd guide roller

2553-1463-01	φD1: −4.03, φD2: −3.73
2553-1464-01	φD1: −4.03, φD2: −3.73
2553-1465-01	φD1: −4.03, φD2: −3.73
2553-1466-01	φD1: −4.02, φD2: −3.72
2553-1467-01	φD1: −4.02, φD2: −3.72
2553-1468-01	φD1: −4.02, φD2: −3.72
2553-1469-01	φD1: −4.01, φD2: −3.71
2553-1470-01	φD1: −4.01, φD2: −3.71
2553-1471-01	φD1: −4.01, φD2: −3.71

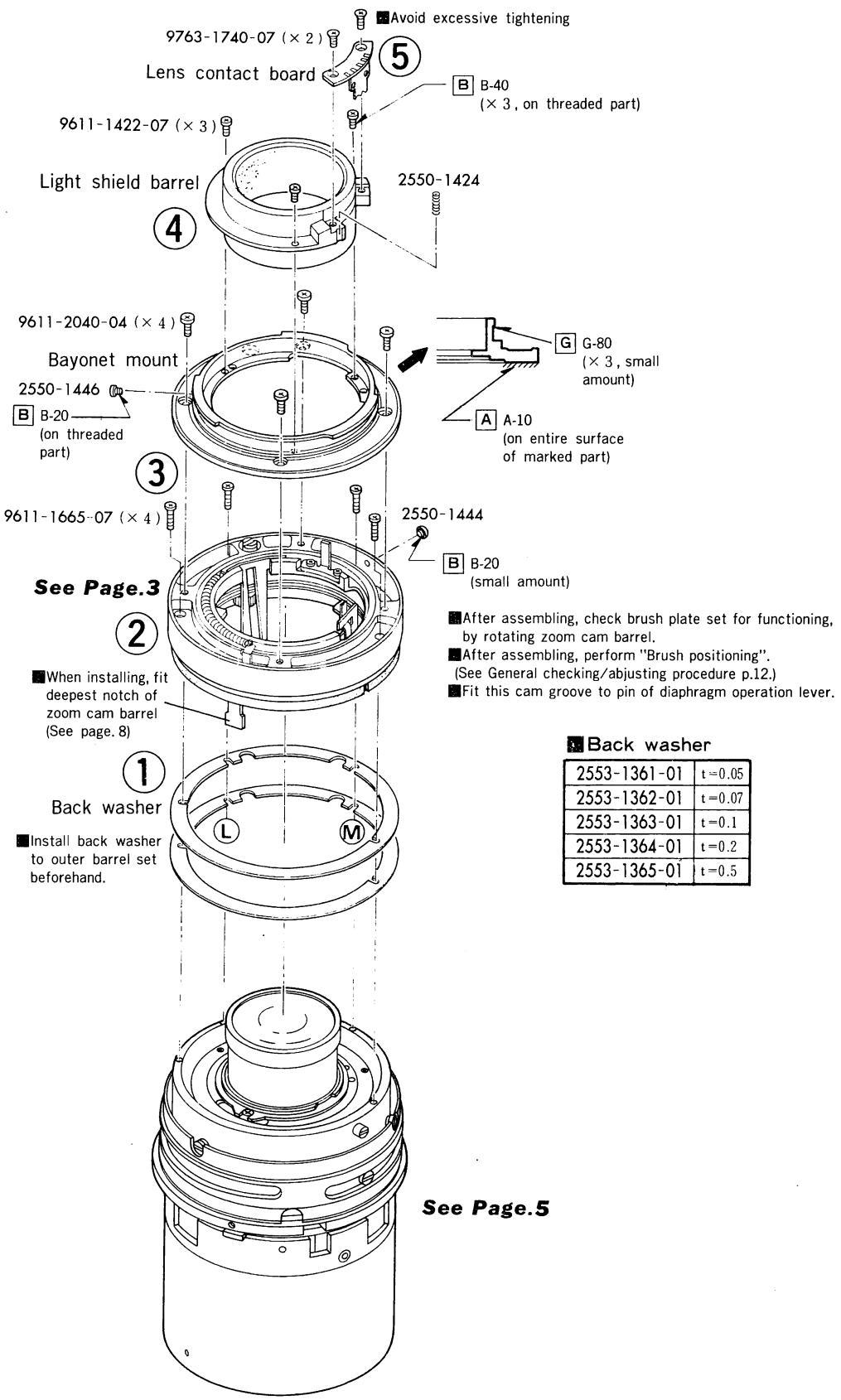
■4th guide roller

2553-1472-01	φD1: −4.03, φD2: −3.73
2553-1473-01	φD1: −4.03, φD2: −3.72
2553-1474-01	φD1: −4.03, φD2: −3.71
2553-1475-01	φD1: −4.02, φD2: −3.73
2553-1476-01	φD1: −4.02, φD2: −3.72
2553-1477-01	φD1: −4.02, φD2: −3.71
2553-1478-01	φD1: −4.01, φD2: −3.73
2553-1479-01	φD1: −4.01, φD2: −3.72
2553-1480-01	φD1: −4.01, φD2: −3.71

6 Back washer, Bayonet mount, Light shield ring, Lens contact board

■Assemble the parts in the order of ①—⑦.

■After assembling, turn zoom cam barrel conterclockwise to stop position and then pre-check/adjust aperture diameter. See Aperture diameter checking (including pre-check) on next page.



■Back washer

2553-1361-01	t=0.05
2553-1362-01	t=0.07
2553-1363-01	t=0.1
2553-1364-01	t=0.2
2553-1365-01	t=0.5

Code No. 2553-100
Code No. 2553-600

■ Aperture diameter checking (including pre-check)

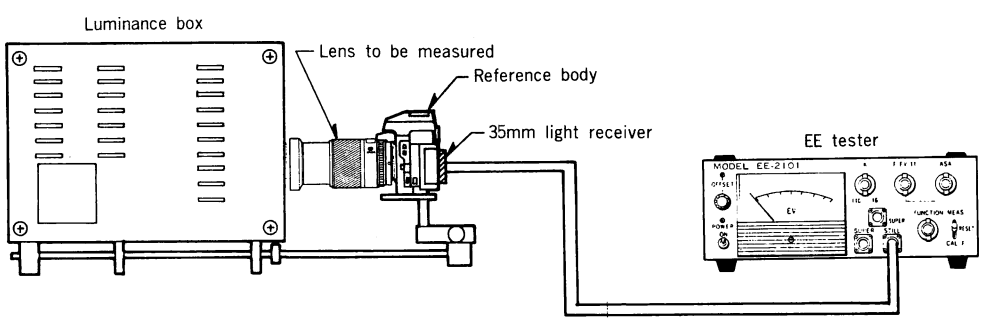
Since aperture diameter checking procedure of this model differs from one of regular A-lens, General checking/adjusting procedure is not usable. Therefore, check aperture diameter following procedure below.

(Perform pre-checking after assembling p. 6. For final check, complete assembling. Both checking proceudres are the same.)

■ Measuring instruments : Luminance box (Model L-2101, L-222※, L-223※) ※Discontinued model
: EE tester (Model EE-2101, EE-2111)
: 35mm light receiver
: Reference body (Select following General checking procedure on p. 9.)

■ Preparation

1. Set measuring instruments as below.



- Luminance box
  K value : 1.2
  Luminance : EV 11
- Lens to be measured
  Distance scale ring : ∞ (infinity)
  Zoom operation ring : 135mm
- Reference body
  Mode : M
  Shutter speed setting : bulb
  Aperture : f/11
  Focus mode : M
- EE tester
  FUNCTION : 35
  ASA : F
  K value : 1.2
  MEAS-CAL : CALF
  F : 11

■ Checking procedures

1. Release the shutter several times and take the average of reading values.
2. Make sure that aperture diameter error, which is calculated as below, is within the allowable range.

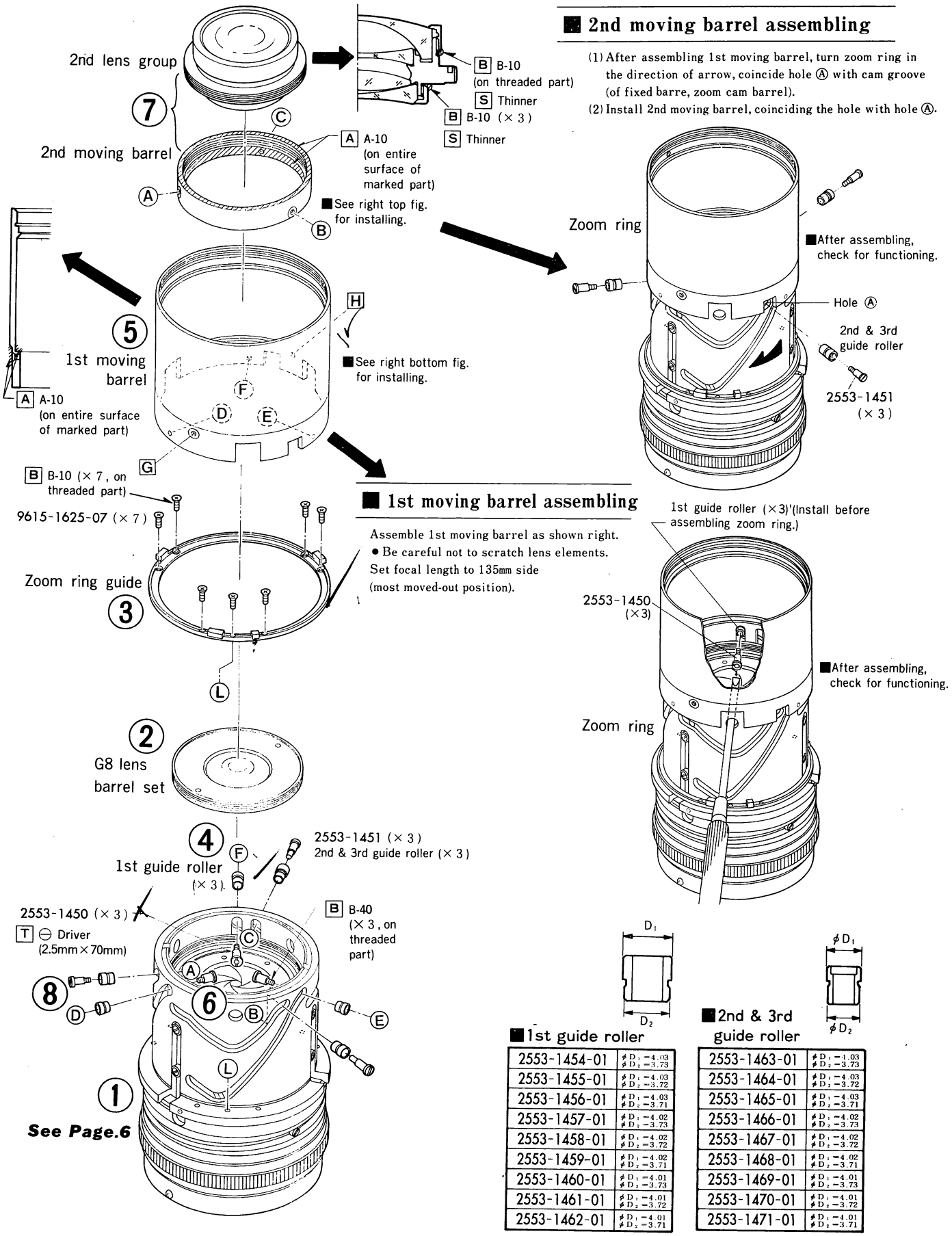
Aperture diameter error	=	Average of reading values	−	Reference value

(Refer to General checking/adjusting procedure p. 9.)

Allowable range
(0±0.4)EV

7 G8 lens barrel set, Zoom ring guide, Zoom ring, 1st moving barrel, 2nd moving barrel

■Assemble the parts in the order of ①–⑧



■ 2nd moving barrel assembling

(1) After assembling 1st moving barrel, turn zoom ring in the direction of arrow, coincide hole Ⓐ with cam groove (of fixed barre, zoom cam barrel).
(2) Install 2nd moving barrel, coinciding the hole with hole Ⓐ.

■ 1st moving barrel assembling

Assemble 1st moving barrel as shown right.
• Be careful not to scratch lens elements.
Set focal length to 135mm side (most moved-out position).

■1st guide roller

2553-1454-01	φD1 −4.03 φD2 −3.73
2553-1455-01	φD1 −4.03 φD2 −3.72
2553-1456-01	φD1 −4.03 φD2 −3.71
2553-1457-01	φD1 −4.02 φD2 −3.73
2553-1458-01	φD1 −4.02 φD2 −3.72
2553-1459-01	φD1 −4.02 φD2 −3.71
2553-1460-01	φD1 −4.01 φD2 −3.73
2553-1461-01	φD1 −4.01 φD2 −3.72
2553-1462-01	φD1 −4.01 φD2 −3.71

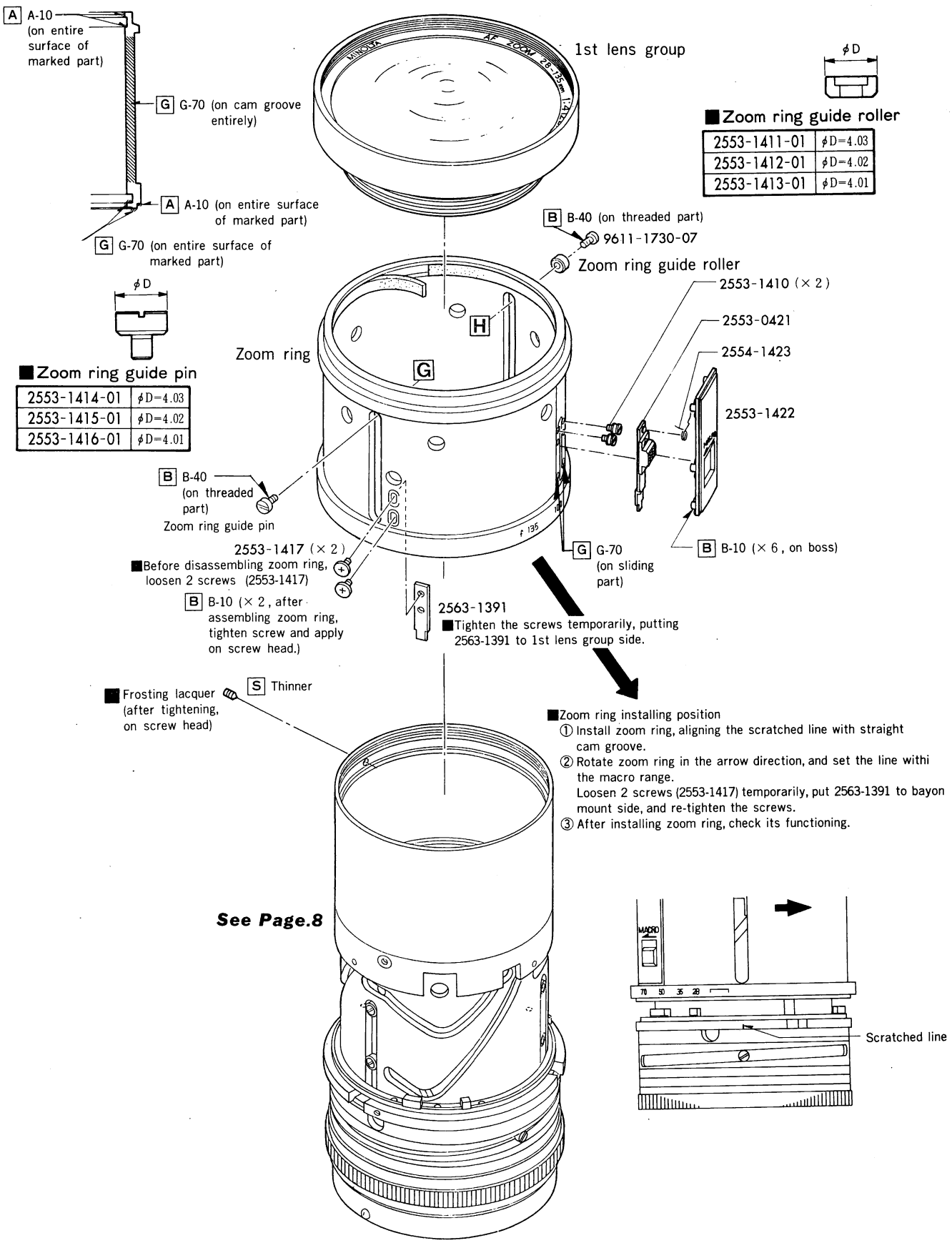
■2nd & 3rd guide roller

2553-1463-01	φD1 −4.03 φD2 −3.73
2553-1464-01	φD1 −4.03 φD2 −3.72
2553-1465-01	φD1 −4.03 φD2 −3.71
2553-1466-01	φD1 −4.02 φD2 −3.73
2553-1467-01	φD1 −4.02 φD2 −3.72
2553-1468-01	φD1 −4.02 φD2 −3.71
2553-1469-01	φD1 −4.01 φD2 −3.73
2553-1470-01	φD1 −4.01 φD2 −3.72
2553-1471-01	φD1 −4.01 φD2 −3.71

8 1st lens group, Zoom ring

■Assemble the parts in the order of ①–⑦.

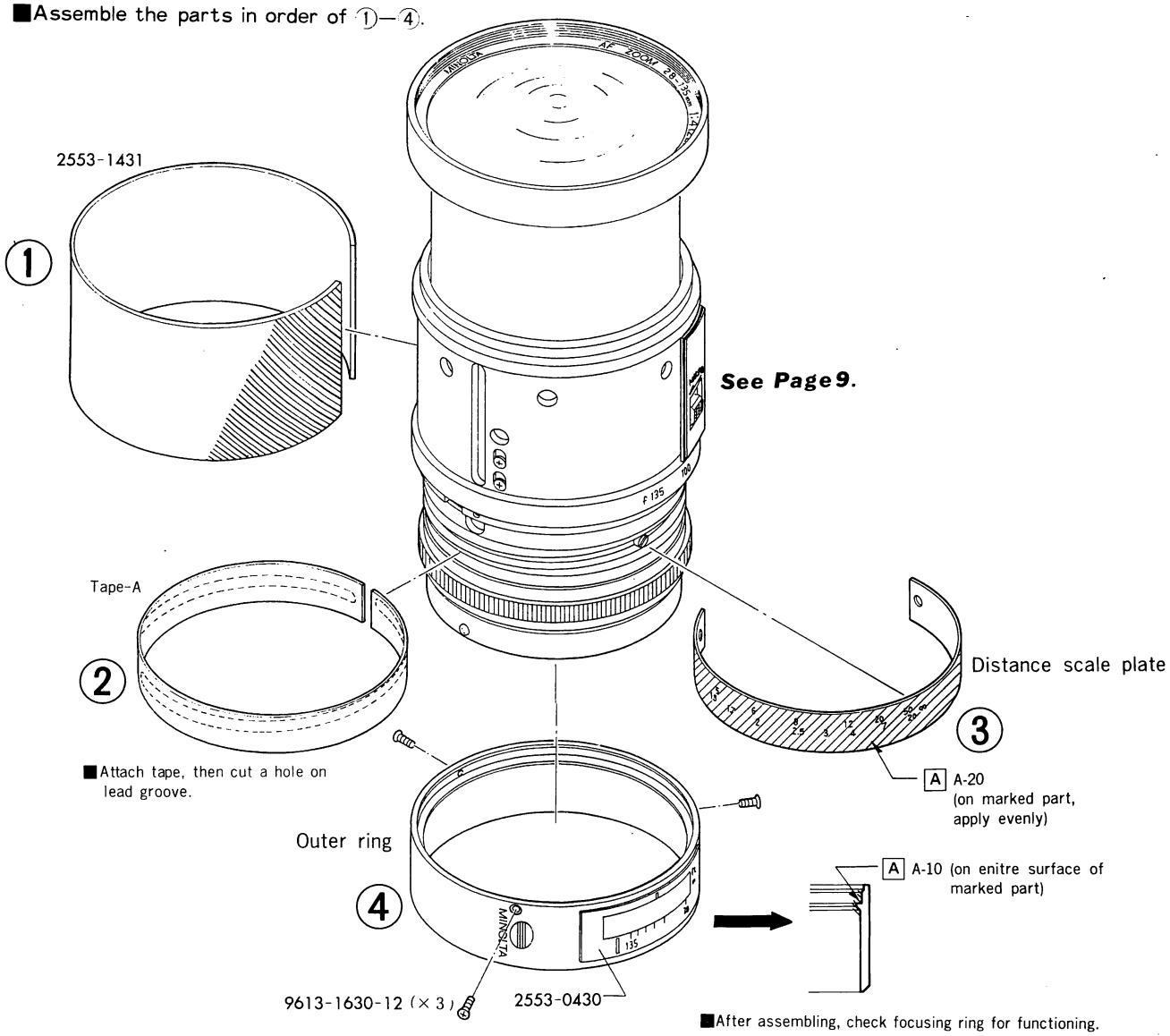
■After assembling the parts ①–④, perform "Focus shift adjusting". (See p. 11.)



See Page.8

9 Distance scale plate, Outer ring

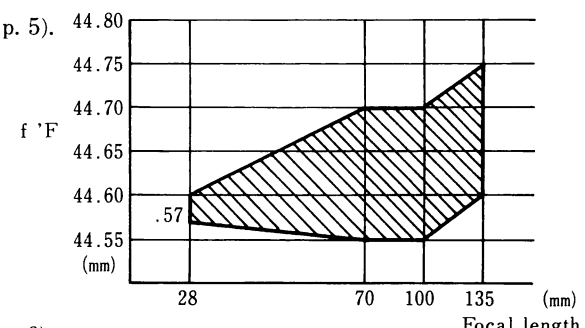
■Assemble the parts in order of ①—④.



■After assembling, perform the following checking/adjusting.

(1) Adjust flange back
(referring to General checking/adjusting procedure on p. 5).
※See p. 5 for back washer.

f (mm)	f'F (mm)
28	$44.57^{+0.03}_{0}$
100	$44.55^{+0.15}_{0}$
135	$44.60^{+0.15}_{0}$



(2) Check projection resolving power
(referring to General checking/adjusting procedure on p. 6).

Allowable range for Servicing (min.)

f (mm)	Distance D (m)	Center (y' = 0)	y' = 15	
			S	M
28	1.5—1.6	100	40	32
100	2.5—4.15	100	40	32
135	2.5—5.5	100	40	32

S : Sagittal image
M : Meridional image

(3) Check aperture diameter
(referring to Aperture diameter checking p. 6.)

(4) Check brush position.
(referring to General checking/adjusting procedure on p. 12).

(5) Check general function
(referring to General checking/adjusting procedure on p. 14).

■ Adjusting procedure of focus shift

■Measuring instruments : Collimator (Model RC-1000 Ⅰ*, Ⅱ*, Ⅲ) ※Discontinued model
: Flange back checking tester (FB-1)
: A-mount attachment for FB-1
: Flange back gauge (43.50mm)

■See "Focus shift/flange back measuring, adjusting procedure, for zoom lens" on p. 3 of General checking/adjusting procedure for preparation and measuring procedure of focus shift.

■Adjusting procedure

(1) Attach lens to flange back checking tester (FB-1) and position lead groove barrel as fig. below.

(2) Set lens to minimum focal length (28mm). Adjust focus, turning focusing knob of microscope, so that green and red colors (of chart) appear in equal quantity.

(3) Set lens to maximum focal length (135mm). Adjust focus, turning lead groove barrel, so that green and red colors (of chart) apper in equal quantity.
- If red color is greater·····Turn lead groove barrel in direction of arrow Ⓐ.
- If green color is greater·····Turn lead groove barrel in direction of arrow Ⓑ.

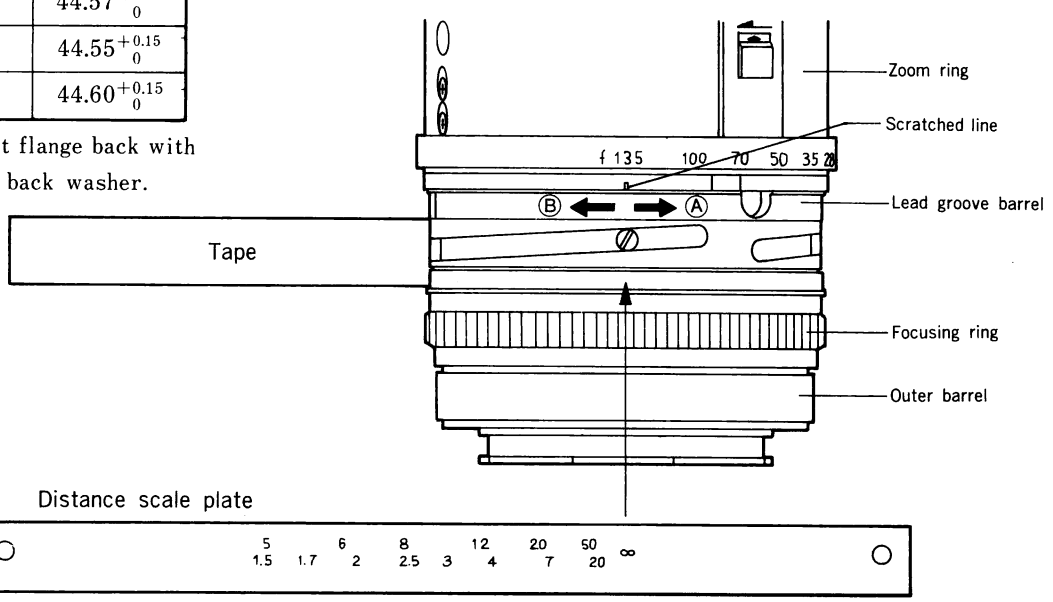
(4) Repeat above (2)—(3) for 3 or 4 times so that focal points at 28mm and 135mm are almost the same.

(5) Attach tape as shown below. Check if each flange back (at 28mm, 100mm, 135mm) meets allowable range below.
Adjust it, if necessary, to minimize focus shift.

(6) Attach distance scale plate, aligning with scratched line.

f (mm)	f' F (mm)
28	$44.57^{+0.03}_{0}$
100	$44.55^{+0.15}_{0}$
135	$44.60^{+0.15}_{0}$

※Adjust flange back with using back washer.



[For adjusting focus shift]

Generally, focus shift is adjusted to equal at tele and wide ends.

On this lens, however, adjust f'F at tele and 0.15mm longer than that of wide end for easier way to meet the above allowable range.

Longer f'F is rather convenient for prevention of the out-of-focus at infinity setting.

■ Lens brush position checking/adjusting procedure

Checking/adjusting of zoom lens for brush position of rotary encoder for variable information input/output.

Preparation

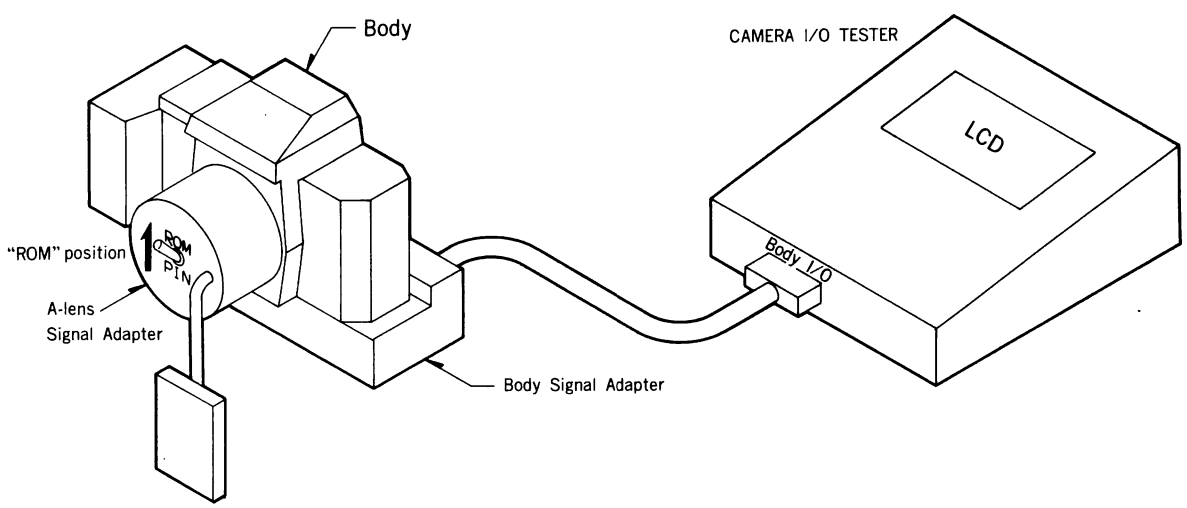
For this checking/adjusting, pre-check the measured lens for ROM-IC following p. 14 "General checking/adjusting procedure.

■ Measuring instruments : Camera I/O tester (Model IO-5101)
: Reference body (See p. 4 "Selecting reference body")

■ Selecting reference body

(1) Set the measuring instruments as Fig. 1.

■ Fig. 1



- A-lens Signal Adapter
  Switch : ROM
- Body
  Sw. M : ON or
  Focus mode Sw. : M
- CAMERA I/O TESTER
  Measuring item : Lens ROM signal checking

- Use Program Pack Ver. ✳ for Camera I/O Tester.
  ✳Underlined part (number) will increase with the new model of lens.
- Any model (7000/5000/9000) can be used as reference camera body, if the appropriate Body Signal Adapter is attached.
  7000 + Body Signal Adapter Ⅲ or Ⅰ
  5000 + Body Signal Adapter Ⅲ
  9000 + Body Signal Adapter Ⅱ

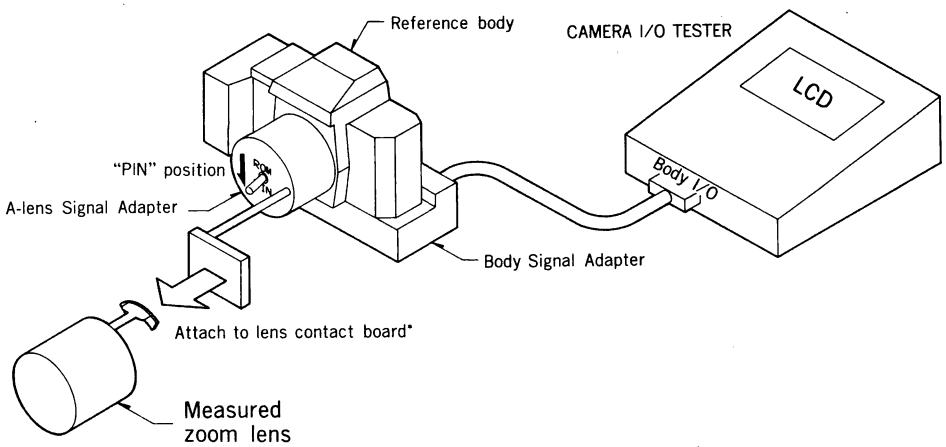
(2) Make sure that code No. and focal length/f number ✳ of measured lens appear on LCD of Camera I/O Tester.
✳e.g. "2550 : 50/1.7"

- If "Check Body Settings!" or "ERROR" display appears, exchange the body to re-check.

■Checking/adjusting

1. Set the measuring instruments as Fig. 1.

■Fig. 1



- Measured zoom lens
  Zoom ring : Stop position in tele or wide side
  (For attaching, see Fig. 2 or Repair Guide.)
- A-lens Signal Adapter
  Switch : PIN
- Reference body
  Sw. M : ON or
  Focus mode Sw. : M
- CAMERA I/O TESTER
  Measuring item : Lens brush positioning
  (Program Pack : Ver. 6.)

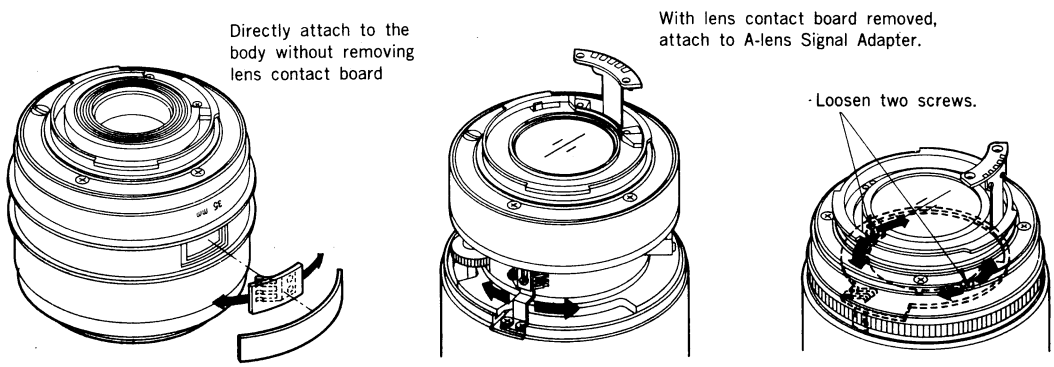
For checking of brush position, directly attach the lens, without disassemling, to the body.
(A-lens Signal Adapter not required)

2. Set zoom ring to tele or wide (depending on model. See Fig. 2) until it stops. Make sure "OK" appears on LCD of Camera I/O tester.
3. If "OUT" appears, adjust lens brush position so that "OK" appears. (For adjusting procedure, see Fig. 2 or Repair Guide.)
4. Give zoom ring one return and set it to tele or wide (depending on model) until it stops. Make sure "OK" appears on LCD. If "OUT" appears, repeat steps from "3" above.

Attaching of A-lens Signal Adapter/Setting of zoom ring

(For other lenses, see Repair Guide of each model)

■Fig. 2



Ex. 35-70mm F4 (Set to tele)

Ex. 70-210mm F4 (Set to tele)
35-105mm F3.5-4.5 (Set to tele)
28-85mm F3.5-4.5 (Set to tele)

Ex. 28-135mm F3.5-4.5
(Set to wide)

■ General checking/adjusting procedure

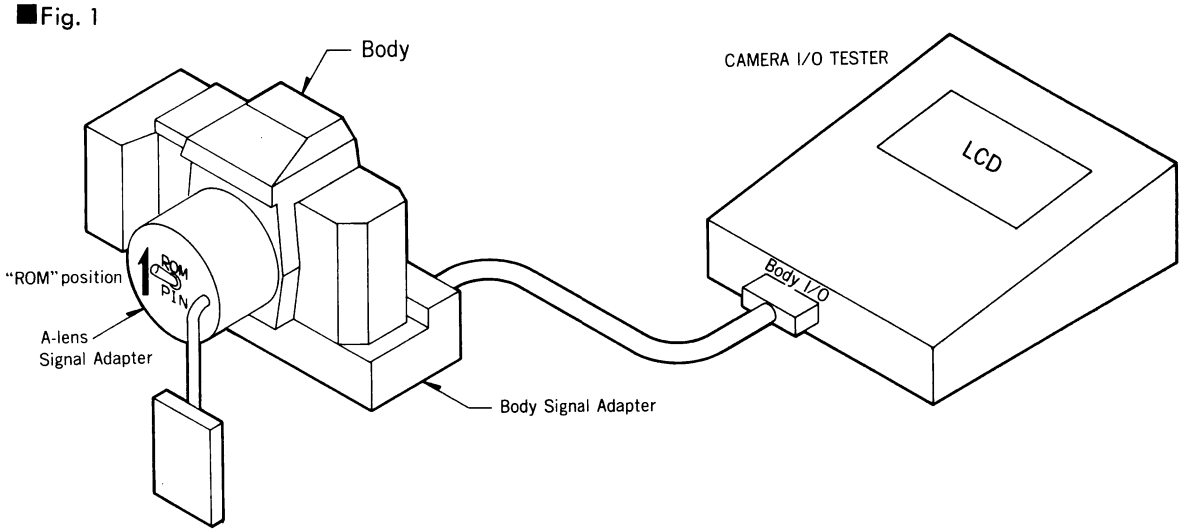
1. Lens ROM signal checking.

■Measuring instruments : Camera I/O tester (Model IO-5101)
: Reference body (See below)

■Selecting reference body

(1) Set the measuring instruments as Fig. 1.

■Fig. 1



- A-lens Signal Adapter
  Switch : ROM
- Body
  Sw. M : ON or
  Focus mode Sw. : M
- CAMERA I/O TESTER
  Measuring item : Lens ROM signal checking
  (Program Pack : Ver. 6.)

- Use Program Pack Ver. 6. ＊ for Camera I/O Tester.
  ＊Underlined part (number) will increase with the new model of lens.
- Any model (7000/5000/9000) can be used as reference camera body, if the appropriate Body Signal Adapter is attached.
  7000 + Body Signal Adapter Ⅲ or Ⅰ
  5000 + Body Signal Adapter Ⅲ
  9000 + Body Signal Adapter Ⅱ

(2) Make sure that code No. and focal length/f number ＊ of measured lens appear on LCD of Camera I/O Tester.
＊e.g. "2550 : 50/1.7"
- If "Check Body Settings!" or "ERROR" display appears, exchange the body to re-check.

■Checking

For single focal-length lens…

(1) After checking the body, detach A-lens Signal Adapter from the body, and attach measured lens instead. (Refer to Fig. 1)

(2) Make sure that code No. and focal length/f number＊ of measured lens appear on LCD of Camera I/O Tester.
＊e.g. "2550 : 50/1.7"
- "MACRO" also appears for macro lens.
- Some lenses (e.g. 135/2.8, Macro lens) have distance switch built in. And the distance-switch-indication-frame (∞ ＊ □□□□) appears on LCD of Camera I/O Tester when the lens is attached. For checking procedure of those lenses, see p. 17.

(3) If "Check Body Settings!", "ERROR", or other lens's code No. appears, the lens has some troubles. Repair, following Trouble-Shooting Chart.

For zoom lens···

(1) After selecting body (p. 14 Fig. 1), detach A-lens Signal Adapter from the body.

(2) Attach the lens to the body with zoom ring set to tele until it stops.

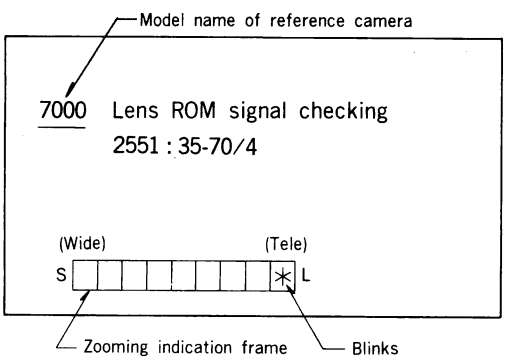
(3) Make sure that code No. and focal length/f number* of measured lens appear on LCD of Camera I/O Tester, and that "*" blinks at right end (tele side) of zooming indication frame. (Refer to fig. 2.)

*e.g. "2551 : 35-70/4"

- Some lenses (e.g. 70-210/4) have distance switch built in.
  Distance-switch-indication-frame and zooming indication frame appear on LCD of Camera I/O Tester when the lens is attached.
  For checking procedure of those lenses, see p. 17.

■Fig. 2

e.g. Camera I/O tester LCD display with 35-70mm f4



(Indicates contact position of brush.
Number of frame depends on the model)

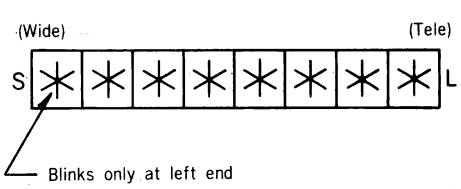
- No letters in ( ) appear.
- If "ERROR", or other lens's code No. appears, the lens has some troubles. Repair, following Trouble-Shooting Chart.
- If normal signal does not appear in the zooming indication frame, check and repair brush for position/contact.

(4) Turn zoom ring SLOWLY to wide.

"*" should blink and increase in number from right side of zooming indication frame in order. By turning zoom ring to wide until it stops, make sure "*" only at the left end should blink, and other "*" signals should glow. (Refer to Fig. 3)

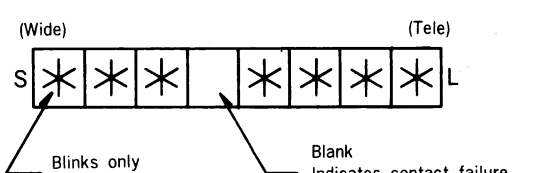
■Fig. 3 (Display of zooming indication frame with 35-70mm f/4)

Example of normal lens



(Number of "*" signal increases from right side in order)

Example of defective lens



(Turning zoom ring fast will the similar display to above. For correct checking, turn zoom ring SLOWLY as much as possible)

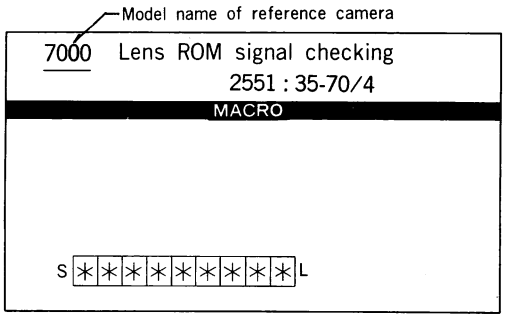
(5) Re-turn zoom ring SLOWLY to tele side.

Make sure position of "*" signal blinking moves from left (wide side) to right (tele) each after each.

(6) With zoom ring set at MACRO, turn zoom ring SLOWLY.
Make sure "MACRO" always appears on LCD as Fig. 5.

■Fig. 4

e.g. Camera I/O tester LCD display with 35-70mm f/4

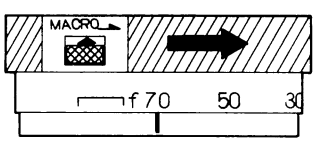


- "MACRO" always appears with zoom lens in macro range.
- "MACRO" appears only with zoom lens for which macro is set by zoom ring.
  (e.g. No "MACRO" display with 70-210mm f/4)

(7) Turn and reset zoom ring to zoom range. Turn zoom ring until it stops (to tele or wide depending on model)
Make sure NO "MACRO" appears.

■Fig. 5

e.g. 35-70mm f/4



In zoom range, turn zoom ring in the direction of arrow (f=70mm side) until it stops.

- If "MACRO" appears, check/adjust lens brush position (p. 12).

General checking/adjusting procedure

For lenses having distance switch built-in

(e.g. MACRO 100/2.8, MACRO 50/2.8, 135/2.8, 70-210/4)

Distance-switch-indication-frame appears on LCD of Camera I/O Tester as fig. 6, 7 when the lens has distance switch (or rotary encoder) built-in.

For those lenses, follow the checking procedure below.

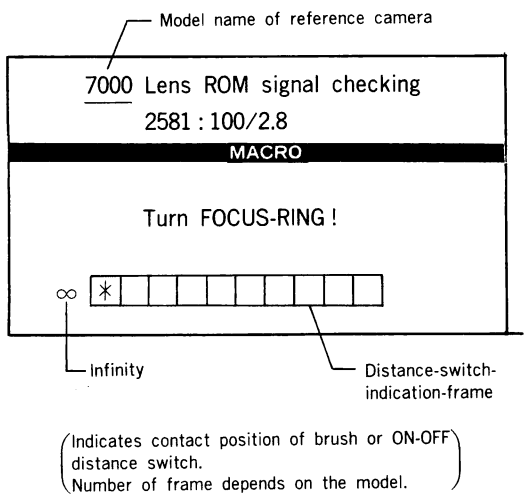
① After selecting the reference camera body (fig. 1 on p. 14), detach A-lens Signal Adapter from the camera.

② Attach the lens to the camera with zoom ring set to tele end, with focus ring set to ∞ (infinity).

③ Make sure the lens code No. and focal length/f number appear on LCD of Camera I/O Tester as fig. 6/7.

- If the lens's information does not appear ("ERROR" or other lens's code No. appears), the lens has some troubles.
  So, repair the lens, following Trouble-Shooting Chart.

■Fig. 6 Display on Camera I/O Tester with MACRO 100mm/f : 2.8 (2581) attached

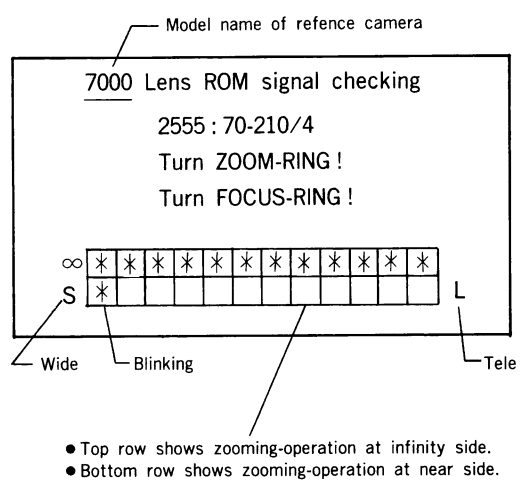


In case of MACRO 100mm/f : 2.8 attached :

④ Turn focus ring SLOWLY from infinity to near side.
Make sure that "✳" increases in number from left side of distance-switch-indication-frame in order. At right end of the frame, "✳" only at the right end should blink, and other "✳" signals glow.

If incorrect display appears, check & repair distance switch, brush, printed wiring for contact failure, short circuit, etc.

■Fig. 7 Display on Camera I/O Tester with 70-210mm/f : 4 lens (2555) attached



In case of 70-210mm/f : 4 attached :

- Set distance to infinity, focal length 210mm.

④ Turn zoom ring SLOWLY to wide.
Make sure that "✳" only at the left end blinks and other "✳" signals glow in the top row.
(See "Checking for zoom lens" on p. 15.)

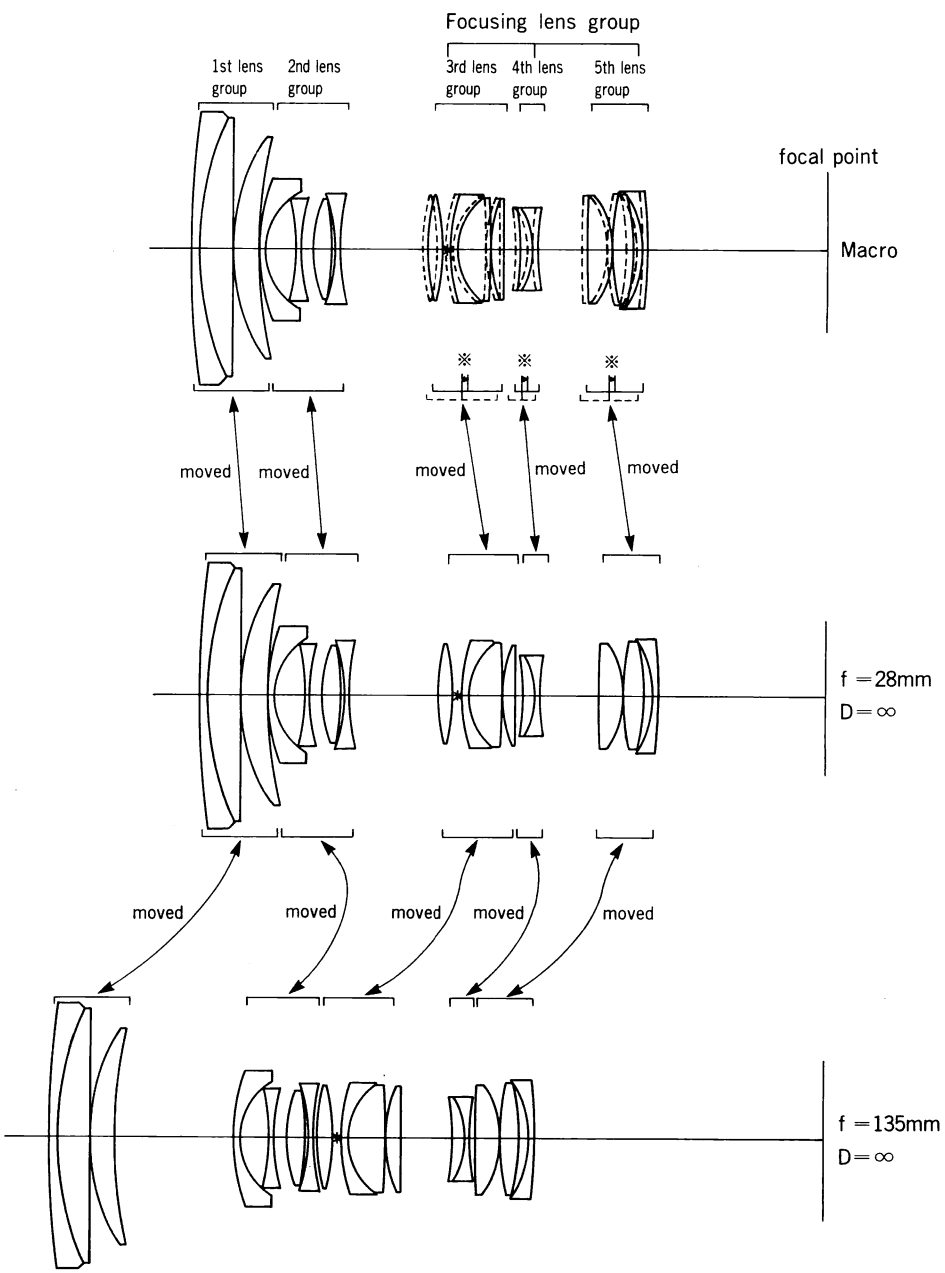
⑤ Turn focus ring SLOWLY to near side.
Make sure that in halfway (around 3m in 2555), "✳" appears at the left end of bottom row of LCD display. (Fig. 7)

⑥ Turn zoom ring again. And make sure that "✳" only at the right end blinks, and other "✳" signals glow.

If incorrect display appears, check & repair distance switch and related parts.

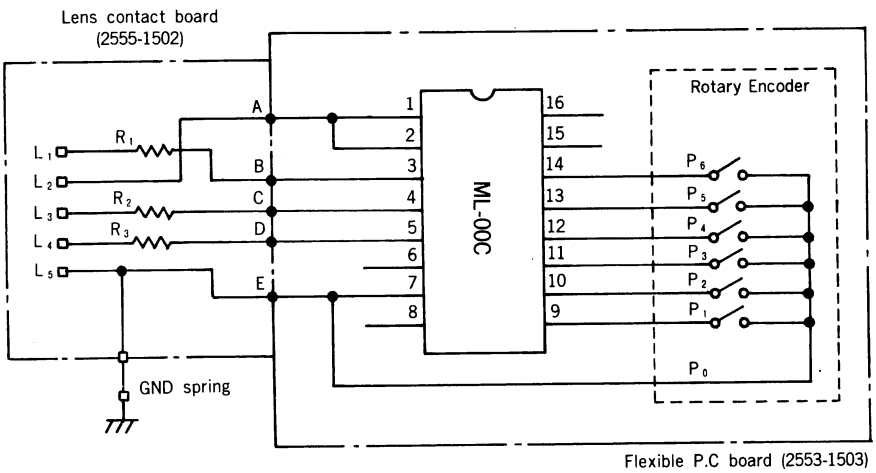
■ Description of focusing and zooming

- 5-component mechanical-compensation zoom lens (positive, negative, positive, negative, positive).
  When zooming, all lens groups are moved, 3rd and 5th lens groups are moved together.
- The diaphragm block is moved with 3rd lens group together.
  This lens has mechanical correction system of aperture diameter to prevent f-number variation by zooming.
- When focusing, 3rd, 4th, 5th lens groups are moved by rotating AF coupler or focusing ring.
  (Rear-component focusing)
- By rotating zoom ring from f=28mm to macro side, 1st and 2nd lens groups, 3rd and 5th lens groups, 4th lens group are moved respectively to make macro set.
  (subject-to-camera distance (D)=1.5m, magnification 1 : 4)



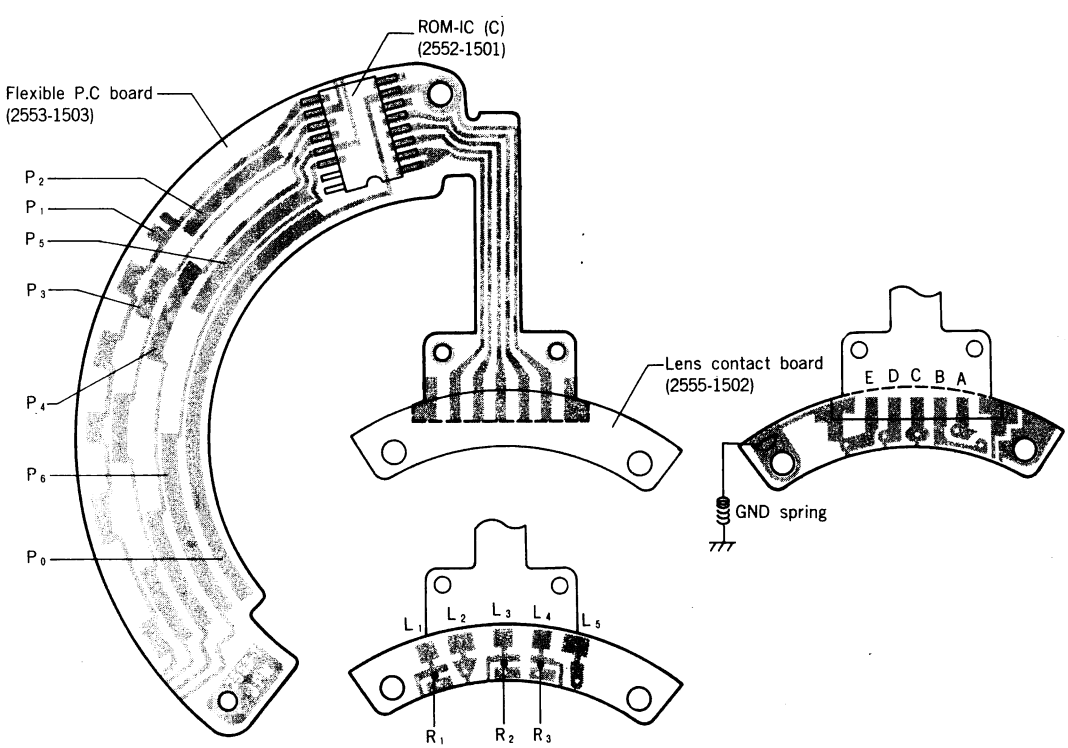
※Moved by rotating focusing ring (D=1.5m)
(AF does not operate at macro set.)

■ Wiring schematic diagram, Printed wiring diagram



L_{1-5} : Lens signal contact
R_{1-3} : Printed resistor

ML-00C : ROM-IC
A–E : Soldering point
P_{0-6} : Rotary encoder pattern switch
(ON/OFF at certain zooming point)



SERVICE MANUAL SUPPLEMENTARY INFORMATION

AF ZOOM 28-135mm F4-4.5(22)
Model MAXXUM AF ZOOM 28-135mm F4-4.5(22)

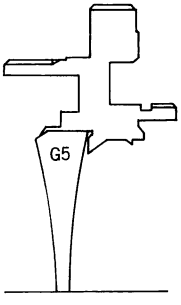
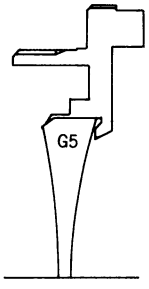
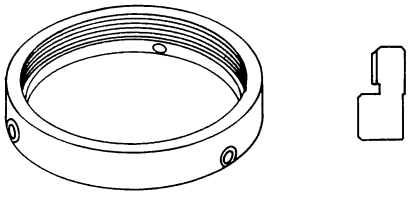
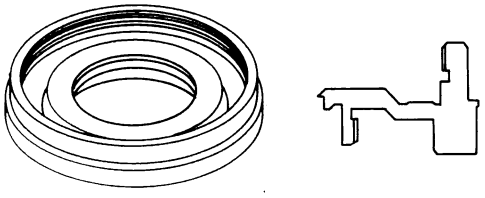
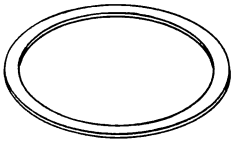
Code No. 2553-100, -600

■Part modification of 2nd moving lens group

■Parts of 2nd moving lens group are modified to make the adjusting spherical abberation* possible.
*Focus shift, caused by aperture stopping down.

1. Parts Modification details

The interchangeability : Parts are replaceable as a set.
Perform the measurement and the adjustment on next page, whenever the parts are replaced by new ones as a set.

Previous type	New type
2nd lens barrel set (2553-0032-01) 	2nd lens barrel set (2553-0032-02) 
2nd moving barrel (2553-1107-02) 	2nd moving barrel (2553-1107-04) 
—	Adjustment washer-A, -B, -C (Newly added) A : 2553-1387-01 t=0.05mm B : 2553-1388-01 t=0.07mm C : 2553-1389-01 t=0.10mm  Caution : Total thickness of washers should be in between 0.07mm and 0.14mm.

✣This information should be filed additionally to Service Manual.

2. Measuring/adjusting procedure of focus-shift caused by stopping down

〔Outline〕

Measure flange backs (f'F) at full-opening aperture and at f : 8, and adjust the clearance between G5 and G6 in order that the difference of flange backs meets the allowable range.

(1) Measuring procedure

① Adjust focus-shift (caused by zooming), referring to Service Manual Repair Guide p. 11. Usually, adjustment washer-C 2553-1389-01 (1pc, t=0.1mm ; standard) is installed as ④ in fig. 2.

② Measure flange-back at full-opening aperture with focal length of 135mm, and record the value.

③ Measure flange-back at f : 8 ※1 with focal length of 135mm, and record the value.

※1 : Attach aberration-measuring-cap (see next page.) to the lens.

Avoid the measurement error since chart image is dark and hard to see.

④ Find the difference of the values ② and ③.

(f'F at F8) − (f'F at full opening aperture) = focus shift caused by stopping down "S"

⑤ Check if "S" (focus shift caused by stopping down) meets the range of 0.0-0.2mm.
If so, the following adjustment is unnecessary.

(2) Adjusting procedure

① Disassemble the lens as right fig.

② Change the thickness of adjustment-washers.
(Amount of changing equals to one-fifth of change of focus-shift.)

Caution

Total thickness should be in between 0.07 mm and 0.14mm.

- If "S" is below 0.0mm, increase the thickness.
- If "S" is over 0.2mm, decrease the thickness.

There are 3 kinds of adjustment-washer as table 1.

The 4 combinations of washer are possible as table 2.

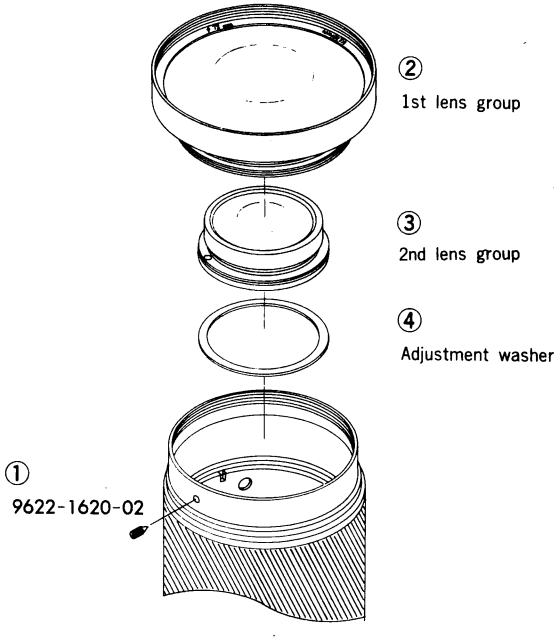


Table-1 Adjustment washer

Part number	Thickness (mm)
A : 2553-1387-01	t=0.05
B : 2553-1388-01	t=0.07
C : 2553-1389-01	t=0.1

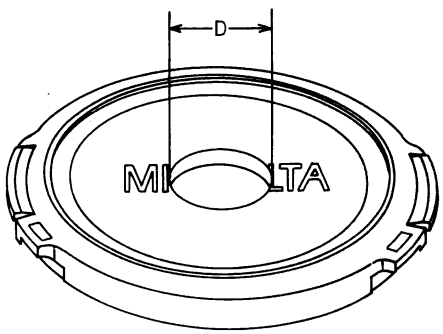
Table-2 Combination of washers

Thickness of washer	Change of focus shift "S"
0.07mm (1 pc. of B)	about −0.15mm
0.1mm (1 pc. of C) : standard	———
0.12mm (2 pcs., A+B)	about +0.1mm
0.14mm (2 pcs. of B)	about +0.2mm

③ Re-assemble the lens using the washer(s) selected in ② on previous page.
Perform the adjustment of focus-shift (caused by zooming), referring to Repair Guide p. 11.
And check that focus-shift (caused by stopping down) meets the allowable range, following (1) measuring procedure on previous page.

3. Aberration-measuring-cap (2553-0001-75)

Used for measuring focus-shift (caused by zooming).



D=16.4mm

Fig. 3 Aberration-measuring-cap