

目 次

1. 仕 様	-----	1
2. 展 開 図	-----	3
3. 部 品 表	-----	5
4. 部品対照表	-----	16
5. 組 立 図	-----	18
6. 接着給油図	-----	21
7. 分 解	-----	24
8. 組立・調整	-----	32

C O N T E N T S

1. Specifications	-----	2
2. Exploded Drawings	-----	3
3. Parts List	-----	5
4. Parts Number Reference Table	-----	16
5. Construction of the Lens	-----	18
6. Lubricant and Binding Agent Chart	-----	21
7. Disassembling	-----	40
8. Assembling/Adjustment Procedure	-----	48

1. 仕 様

焦 点 距 離:	35～135mm
最 大 口 径 比:	1:3.5～4.5
レ ン ズ 構 成:	12群15枚
画 角:	62°～18°
焦点距離目盛:	35, 50, 70, 135
距 離 目 盛:	∞～1.5m, 5ft (併記)
ズーム:	直進式
フォーカシング:	回転式 (回転角 74°24')
絞 り 目 盛:	3.5, 5.6, 8, 11, 16, 22 (f/4 はクリックストップのみ)
絞 り 方 式:	自動絞り (最小絞りロック可能)
測 光 方 式:	開放測光
マ ウ ン ト:	ニコン F マウント
アタッチメントサイズ:	62mm (P=0.75)
大 き さ:	φ72.5mm (最大径) × 109mm (全長)
重 量:	約690g
マクロ方式:	ズームリングをWIDE端にて回転させて行う

1 . S p e c i f i c a t i o n s

Focal length:	35~135mm
Maximum aperture:	1:3.5 ~ 4.5
Lens construction:	15 elements in 12 groups
Picture angle:	62° ~ 18°
Focal length scale	35, 50, 70, 135
Distance scale:	∞ ~1.5m, 5ft
Zooming:	Parallel moving
Focusing:	Rotating angle
Aperture scale:	3.5, 5.6, 8, 11, 16, 22
Diaphragm:	Fully automatic Minimum aperture lock is possible
Metering:	Full-aperture measurement
Mount:	Nikon F mount
Attachment size:	62mm (P=0.75)
Dimensions:	$\phi 72.5$ mm (dia.) $\times$ 109mm (long)
Weight:	Approx. 690g
Macro focus device:	Turning zoom ring at 35mm focal length setting

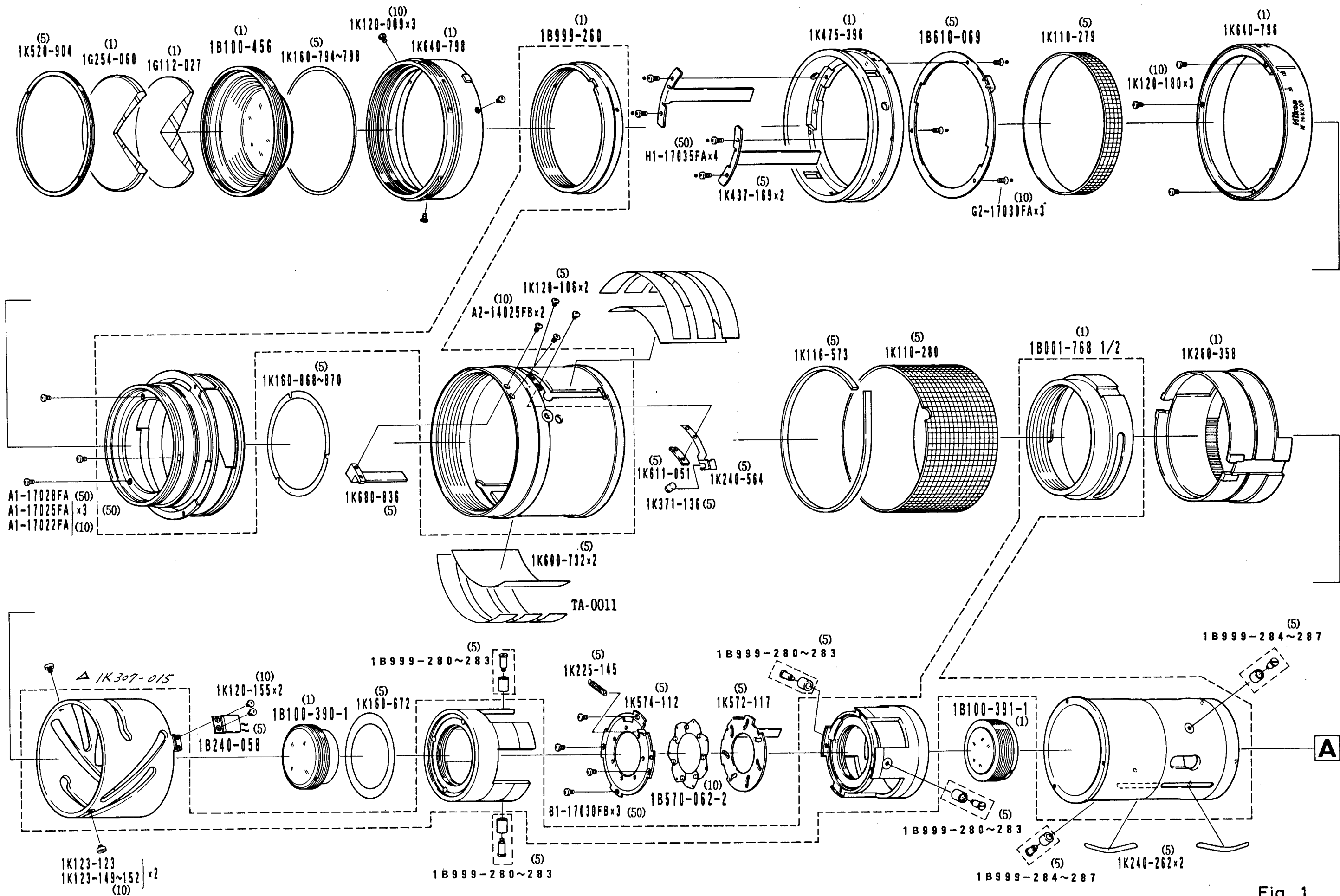


Fig. 1

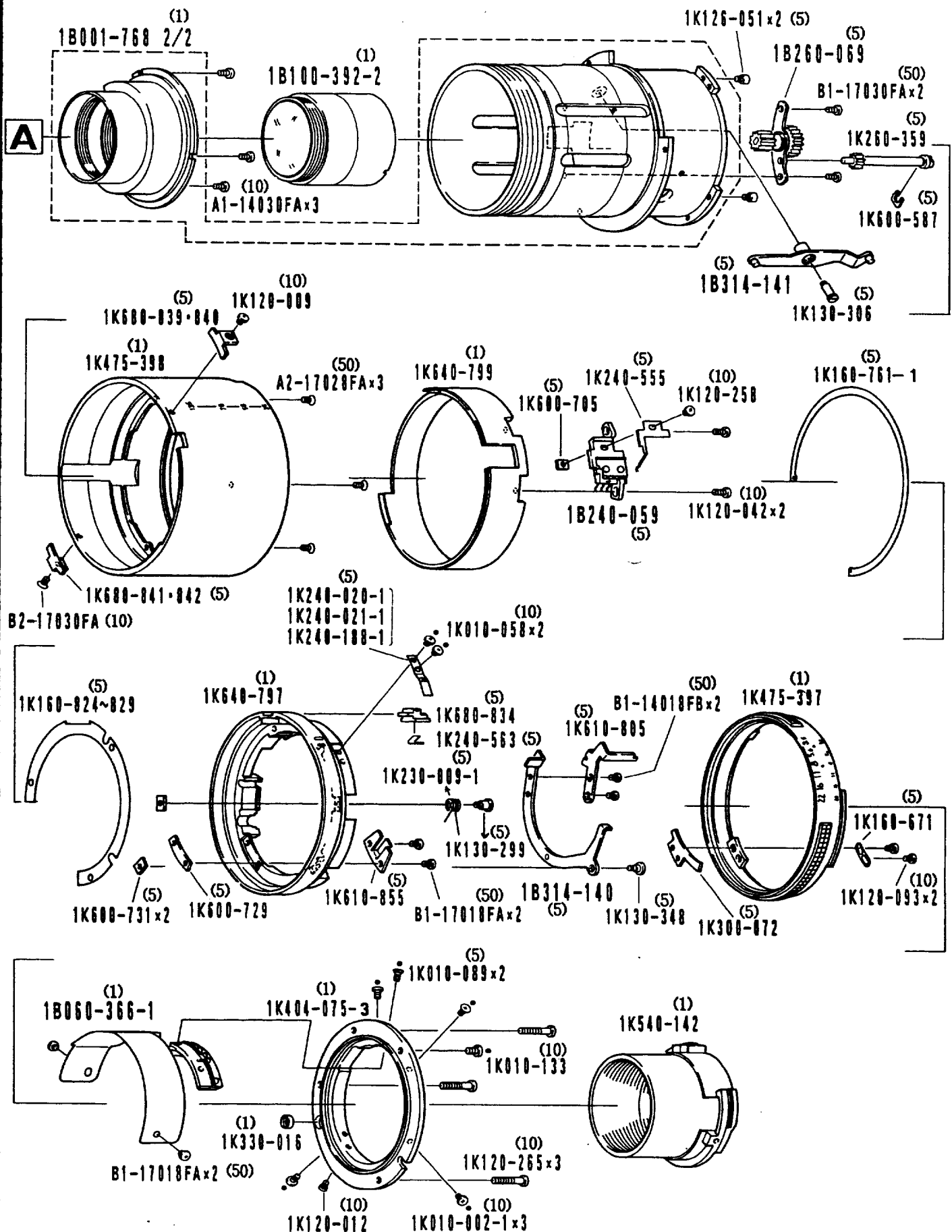


Fig. 2

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 充 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*1K010-002-1	119	Screw	3		2.4	○		10
*1K010-058	116	Screw	2		2.3	○		10
*1K010-089	118	Screw	2		2.4	○		5
1K010-133	135	Screw	1		2.4	○		10
1K110-279	37	ゴムリング Rubber ring	1		1.3	○		5
1K110-280	80	ゴムリング Rubber ring	1		1.3	○		5
*1K116-266	93	ガイド環 $\phi 4.5 \begin{smallmatrix} +0.01 \\ -0.02 \end{smallmatrix}$ Guide ring	0~4	18999-280	3	△		5
*1K116-267	93	ガイド環 $\phi 4.5 \begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$ Guide ring	0~4	18999-281	3	△		5
*1K116-268	93	ガイド環 $\phi 4.5 \begin{smallmatrix} +0.01 \\ 0 \end{smallmatrix}$ Guide ring	0~4	18999-282	3	△		5
*1K116-269	93	ガイド環 $\phi 4.5 \begin{smallmatrix} +0.01 \\ -0.01 \end{smallmatrix}$ Guide ring	0~4	18999-283	3	△		5
*1K116-270	84	ガイド環 $\phi 4.5 \begin{smallmatrix} +0.01 \\ -0.02 \end{smallmatrix}$ Guide ring	0~2	18999-284	3	△		5
*1K116-271	84	ガイド環 $\phi 4.5 \begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$ Guide ring	0~2	18999-285	3	△		5
*1K116-272	84	ガイド環 $\phi 4.5 \begin{smallmatrix} 0 \\ -0.01 \end{smallmatrix}$ Guide ring	0~2	18999-286	3	△		5
*1K116-273	84	ガイド環 $\phi 4.5 \begin{smallmatrix} +0.01 \\ 0 \end{smallmatrix}$ Guide ring	0~2	18999-287	3	△		5
1K116-573	108	ファインセーム Flock paper	1		1.3	○		5
1K116-574	147	テープ Tape	6		1.3	×	TA-0011	5
*1K120-009	109	Screw	1 X		2.4	○	9227	10
*1K120-012	102	Screw	1		2.3	○		10
追加 1K120-367	106	小ネジ Screw	3		2	○	RP-0227	5

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*1K120-042	86	Screw	2		2.4	○		10
*1K120-093	125	Screw	2		2.4 5	○		10
*1K120-106	114	Screw	2		1.4	○		5
*1K120-155	136	Screw	2		1.3	○		10
*1K120-180	122	Screw	3		1.3	○		10
*1K120-258	88	Screw	1		2.3	○		10
*1K120-265	105	Screw	3		2.4	○		10
*1K123-123	94	Screw	0~2		1.3	○		10
*1K123-149	94	Screw	0~2		1.3	○		10
*1K123-150	94	Screw	0~2		1.3	○		10
*1K123-151	94	Screw	0~2		1.3	○		10
*1K123-152	94	Screw	0~2		1.3	○		10
*1K126-051	104	Screw	2		2.4	○		5
*1K130-296-1 (1K130-296)	92	段付小ネジ Screw	4	1B999-280 5 283	3	△		5
*1K130-297	83	段付小ネジ Screw	2	1B999-284 5 287	3	△		5
*1K130-299	65	段付小ネジ Screw	1		2.4 5	○		5
*1K130-306	59	羽根基板連動レバー軸 Axle	1		2.3	○		5
1K130-348	63	段付小ネジ Screw	1		2.4	○		5

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*IK160-671	133	Washer	1		2.4	○		5
*IK160-672	132	遮光リング Light baffle ring	1		1.3	○		5
*IK160-761-1 (IK160-761)	90	穴止め輪 Ring t = 0.5	1		2.3	○		5
IK160-794	71	Washer t = 0.3±0.03	0~1		1.3	○		5
IK160-795	71	Washer t = 0.2±0.03	0~1		1.3	○		5
IK160-796	71	Washer t = 0.1±0.02	0~1		1.3	○		5
IK160-797	71	Washer t = 0.04±0.005	0~1		1.3	○		5
IK160-798	71	Washer t = 0.03±0.005	0~1		1.3	○		5
IK160-801	71	Washer t = 0.05±0.005	0~1		1.3	○		5
IK160-824	97	Washer t = 0.5±0.02	0~1		2.3	○		5
IK160-825	97	Washer t = 0.05±0.005	0~1		2.3	○		5
IK160-826	97	Washer t = 0.03±0.005	0~1		2.3	○		5
IK160-827	97	Washer t = 0.1±0.01	0~1		2.3	○		5
IK160-828	97	Washer t = 0.2±0.02	0~1		2.3	○		5
IK160-829	97	Washer t = 0.04±0.005	0~1		2.3	○		5
IK160-868	149	Washer t = 0.1±0.02	0~1		1.3	○		5
IK160-869	149	Washer t = 0.2±0.03	0~1		1.3	○		5
IK160-870	149	Washer t = 0.3±0.03	0		1.3	○		5

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*1K225-145	85	引張バネ Spring	1		1.3	○		5
*1K230-009-1 (1K230-009)	66	絞り連動レバーバネ Spring	1		2.4 5	○		5
*1K240-020-1 (1K240-020)	36	クリックバネ t=0.2 Click spring	0~1		2.3	○		5
*1K240-021-1 (1K240-021)	36	クリックバネ t=0.18 Click spring	0~1		2.3	○		5
*1K240-188-1 (1K240-188)	36	クリックバネ t=0.22 Click spring	0~1		2.3	○		5
*1K240-262	127	板バネ t=0.4 Leaf spring	2		1.3	○		5
*1K240-469-1	99	A F 接点バネ AF contact spring	5	1B060-366-1	4	△		
*1K240-555	137	クリックバネ t=0.12 Click spring	1		1.3	○		5
*1K240-556	138	クリックバネ t=0.12 Click spring	1	1B240-058	3	△		
*1K240-557	87	クリックバネ t=0.12 Click spring	1	1B240-059	3	△		
*1K240-563	68	E E ロックバネ EE lock spring	1		2.3	○		5
1K240-564	141	板バネ t=0.3 Leaf spring	1		1.4	○		5
*1K260-284	79	平歯車 Gear	1	1B260-069	4	△		
1K260-358	70	平歯車 Gear	1		1.3	○		1
1K260-359	75	平歯車 Gear	1		2.4	○		5
1K260-360	76	平歯車 Gear	1	1B260-069	4	△		
*1K300-072	21	絞りカム Aperture cam	1		2.4 5	○		5
1K307-015	55	カムリング Cam ring	1	1B001-768	3	△		

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1 台 分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*1K314-274	57	曲げレバー Lever	1	1B314-141	3	△		
*1K314-275	62	曲げレバー Lever	1	1B314-140	4	△		
*1K330-016	74	カップリング軸受けA Coupling bearing A	1		2,4	○		1
*1K370-003	64	ズームングカム筒 Zooming-cam tube	1	1B314-140	5	△		
*1K370-004-2	32	羽根ピン Pin	14	1B570-062-2	3	△		
*1K370-971	60	段付軸 Axel	2	1B314-141	3	△		
*1K370-990	58	段付軸 Axel	1	1B314-141	3	△		
*1K371-136	139	段付軸 Axel	1		1,3	○		5
*1K404-075-3 (1K404-075)	30	バヨネットマウント Bayonet mount	1		2,3	○		1
1K437-169	22	キー Key	2		1,3	○		5
1K475-396	26	MF目盛環 MF ring	1		1,3	○		1
1K475-397	28	絞り環 Aperture ring	1		2,3	○		1
1K475-398	81	距離目盛環 Focusing index ring	1		2,3	○		1
*1K500-610	44	G9-G11レンズ室 G9-G11 lens housing	1	1B100-391-1	3	△		
*1K500-611	45	G12-G15レンズ室 G12-G15 lens housing	1	1B100-392-2	3	△		
*1K500-612	42	G4-G8レンズ室 G4-G8 lens housing	1	1B100-390-1	3	△		
*1K500-698	24	レンズ室 lens housing	1	1B100-456	3	△		
1K520-904	40	G1 押え環 G1 retaining ring	1		1,3	○		5

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
1K535-304	35	メスヘリコイド Helicoid	1	1B535-133	3	△		
1K535-305	52	内側固定筒 Fixing tube	1	1B001-768	3	△		
1K535-306	54	ズームリング Zoom ring	1	1B001-770 1B535-133	3	△		
1K535-307	56	オスヘリコイド Helicoid	1	1B535-133	3	△		
1K535-308	72	マクロヘリコイド Helicoid	1	1B001-768	3	△		
*1K540-142	39	後部保護環 Rear cover ring	1		2.3	○		1
*1K570-065	31	絞り羽根 Aperture blade	7	1B570-062-2	3	△		
*1K572-117	33	絞り作動板 Blade actuating ring	1		1.3	○		5
*1K574-112	34	羽根基板 Blade mounting plate	1		1.3	○		5
*1K600-587	73	平板 Plate	1		2.4	○		5
*1K600-705	107	平板 Plate	1		2.3	○		5
1K600-728	77	平板 Plate	1	1B260-069	4	△		
1K600-729	142	平板 Plate	1		2.4	○		5
1K600-731	144	平板 Plate	2		2.4	○		5
1K600-732	145	平板 Plate	2		1.3	○		5
*1K610-805	23	絞りレバー Aperture lever	1		2.3	○		5
*1K610-855	101	絞りガイド板 Aperture guide plate	1		2.4 5	○		5
1K611-050	61	曲げ板 Bent plate	1	1B610-069	3	△		

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1 台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
1K611-051	146	曲げ板 Bent plate	1		1.4	○		5
*1K630-395	53	4 群吊りリング Fourth eyelet	1	1B001-768	3	△		
*1K630-403	50	2 群移動枠 2nd driving frame	1	1B001-768	3	△		
1K630-501	25	1 群移動枠 1st driving frame	1	1B001-768	3	△		
1K630-502	78	段ギア軸受 Bearing	1	1B260-069	4	△		
1K630-562	51	3 群移動枠 3rd driving frame	1	1B001-768	3	△		
1K640-796	27	社名環 Name ring	1		1.3	○		1
1K640-797	29	マウント固定リング Fixed ring	1		2.3	○		1
1K640-798	38	アタッチメントリング Attachment ring	1		1.3	○		1
1K640-799	89	エンコーダリング Barrel	1		2.5	○		1
1K640-800	140	マクロボタン座 Ring	1	1B001-770	3	△		
*1K680-643-1	98	接点押え板 Contact retainer	1	1B060-366-1	1.4	△		
*1K680-651-1	100	接点FPC取り付け板 Contact, FPC fixing plate	1	1B060-366-1	1.4	△		
1K680-834	67	EEロックレバー EE lock lever	1		2.3	○		5
1K680-835	95	マクロブラシ座 Brush liner	1	1B240-058	3	△		
1K680-836	131	マクロレバー Lever	1		1.3	○		5
1K680-837	134	エンコーダブラシ座 Brush liner	1	1B240-059	4	△		
1K680-838	148	制限ゴム Rubber	1	1B610-069	3	△		

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1 台 分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
1K680-839	82	ズームリングコマ Block	0~1		2,3	○		5
1K680-840	82	ズームリングコマ Block	0~1		2,3	○		5
1K680-841	103	ズームリングコマ Block	0~1		2,3	○		5
1K680-842	103	ズームリングコマ Block	0~1		2,3	○		5
1S015-031-1	B301	CPU組 CPU unit	1	18060-366-1	3	△		
1S205-043-1	305	MOS ロジック MOS	1	1S015-031-1	3	△		
*1S226-008	306	IC M51952AML	1	1S015-031-1	3	△		
*1S310-169	311	チップ固定抵抗器 Resistor	1	1S015-031-1	3	△		
*1S310-170	312	チップ固定抵抗器 Resistor	3	1S015-031-1	3	△		
1S705-095	301	フレキシブルPCB PCB	1	1S015-031-1	3	△		

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
*A1-14030FA	120	Screw	3		2.3	○		10
*A1-17022FA	111	Screw	0~3		1.3	○		50
*A1-17025FA	111	Screw	0~3		1.3	○		50
*A1-17028FA	111	Screw	0~3		2.3	○		10
*A2-14025FB	123	Screw	2		1.3	○		10
*A2-17028FA	126	Screw	3		1.4	○		50
*B1-14018FB	121	Screw	2		1.3	○		50
*B1-17018FA	130	Screw	4		2.4 5	○		50
*B1-17030FA	129	Screw	2		2.4	○		50
*B1-17030FB	110	Screw	4		1.3	○		50
*B2-17030FA	124	Screw	1		2.4	○		10
*G2-17030FA	117	Screw	3		1.3	○		10
*H1-17035FA	113	Screw	4		1.3	○		50

部 品 表 Parts List

JAA73601-R. 3250. A

部品番号 Part No.	補助番号 Ckt. No.	名 称 Name	1台分 個 数 Pcs. Per Unit	部組品番号 Assembly	参照 図番 Fig.	販 売 区 分 Term of Delivery	備 考 Remarks	要 求 単 位 Q'ty per order
1G103-028	5	G 5 レンズ G5 Lens element	1	1B100-390-1	3	△		
1G103-029	14	G15 レンズ G15 Lens element	1	1B100-392-2	3	△		
1G105-028	9	G 9 レンズ G9 Lens element	1	1B100-391-1	3	△		
*1G112-027	2	G 2 レンズ G2 Lens element	1		1,3	○		1
1G144-016	8	G 8 レンズ G8 Lens element	1	1B100-390-1	3	△		
1G153-038	3	G 3 レンズ G3 Lens element	1	1B100-456	3	△		
1G153-039	13	G13 レンズ G13 Lens element	1	1B100-392-2	3	△		
1G154-064-1	11	G11 レンズ G11 Lens element	1	1B100-391-1	3	△		
1G157-058-1	12	G12 レンズ G12 Lens element	1	1B100-392-2	3	△		
1G202-031	7	G 7 レンズ G7 Lens element	1	1B100-390-1	3	△		
1G203-031	6	G 6 レンズ G6 Lens element	1	1B100-390-1	3	△		
1G243-014-1	15	G15 レンズ G15 Lens element	1	1B100-392-2	3	△		
1G245-026-1	4	G 4 レンズ G4 Lens element	1	1B100-390-1	3	△		
1G251-017	10	G10 レンズ G10 Lens element	1	1B100-391-1	3	△		
*1G254-060	1	G 1 レンズ G1 Lens element	1		1,3	○		1

部 組 品 表 Assembly List

JAA73601-R. 3250. A

部組品番号 Assembly No.	補助番号 Ckt. No.	名 称 Name	1 台分 個 数 Pcs. Per Unit	構成部品番号 Constituent Parts	参照 図番 Fig.	備 考 Remarks	要 求 単 位 Q'ty per order
*1B001-768	B10	ヘリコイド環組 Helicoid unit	1	1K307-015 1K535-305 1K535-308 1K630-395 1K630-403 1K630-501 1K630-562	2		1
1B060-366-1	B17	A F 接点組品 Unit AF contact	1	1K240-469-1 1K680-643-1 1K680-651-1 1S015-031-1	2		1
*1B100-390-1 (1B100-390)	B1	G 4 - G 8 レンズ室組 G4-G8 lens housing	1	1K500-612 1G103-028 1G144-016 1G202-031 1G203-031 1G245-026-1	1	◆	1
*1B100-391-1 (1B100-391)	B2	G 9 - G11 レンズ室組 G9-G11 lens housing	1	1K500-610 1G105-028 1G154-064-1 1G251-017	1	◆	1
*1B100-392-2 (1B100-392)	B3	G12 - G15 レンズ室組 G12-G15 lens housing	1	1K500-611 1G103-029 1G153-039 1G157-058-1 1G243-014-1	2	◆	1
1B100-456	B14	G 3 レンズ室組 G3 lens housing	1	1K500-698 1G153-038	1		1
1B240-058	B12	ブラシ部組 Brush unit	1	1K240-556 1K680-835	1		5
1B240-059	B13	ブラシ部組 Brush unit	1	1K240-557 1K680-837	2		5
1B260-069	B15	歯車組 Gear unit	1	1K260-284 1K260-360 1K600-728 1K630-502	2		5
*1B314-140	B4	絞りレバー組 Aperture lever unit	1	1K314-275 1K370-003	2		5
*1B314-141	B5	曲げレバー組 Lever unit	1	1K314-274 1K370-971 1K370-990	2		5
*1B570-062-2 (1B570-062-1)	B7	絞り羽根組 Aperture blade unit	7	1K370-004-2 1K570-065	1		10
1B610-069	B6	曲げ板組 Bent plate unit	1	1K611-050 1K680-838	1		5
1B999-260	B9	ヘリコイド環組 Helicoid unit	1	1K535-304 1K535-306 1K535-307 1K640-800	1		1
1B999-280		ガイド軸 Guide axle	1	1K116-266 , 1K130-296-1	1		5
1B999-281				1K116-267 , 1K130-296-1			
1B999-282				1K116-268 , 1K130-296-1			
1B999-283				1K116-269 , 1K130-296-1			
1B999-284		ガイド軸 Guide axle	1	1K116-270 , 1K130-297	1		5
1B999-285				1K116-271 , 1K130-297			
1B999-286				1K116-272 , 1K130-297			
1B999-287				1K116-273 , 1K130-297			
						◆ -- RP限定出庫 LIMITED	

部品对照表

(P a r t s R e f e r e n c e T a b l e)

[illegible]

部品对照表

(P a r t s R e f e r e n c e T a b l e)

[illegible]

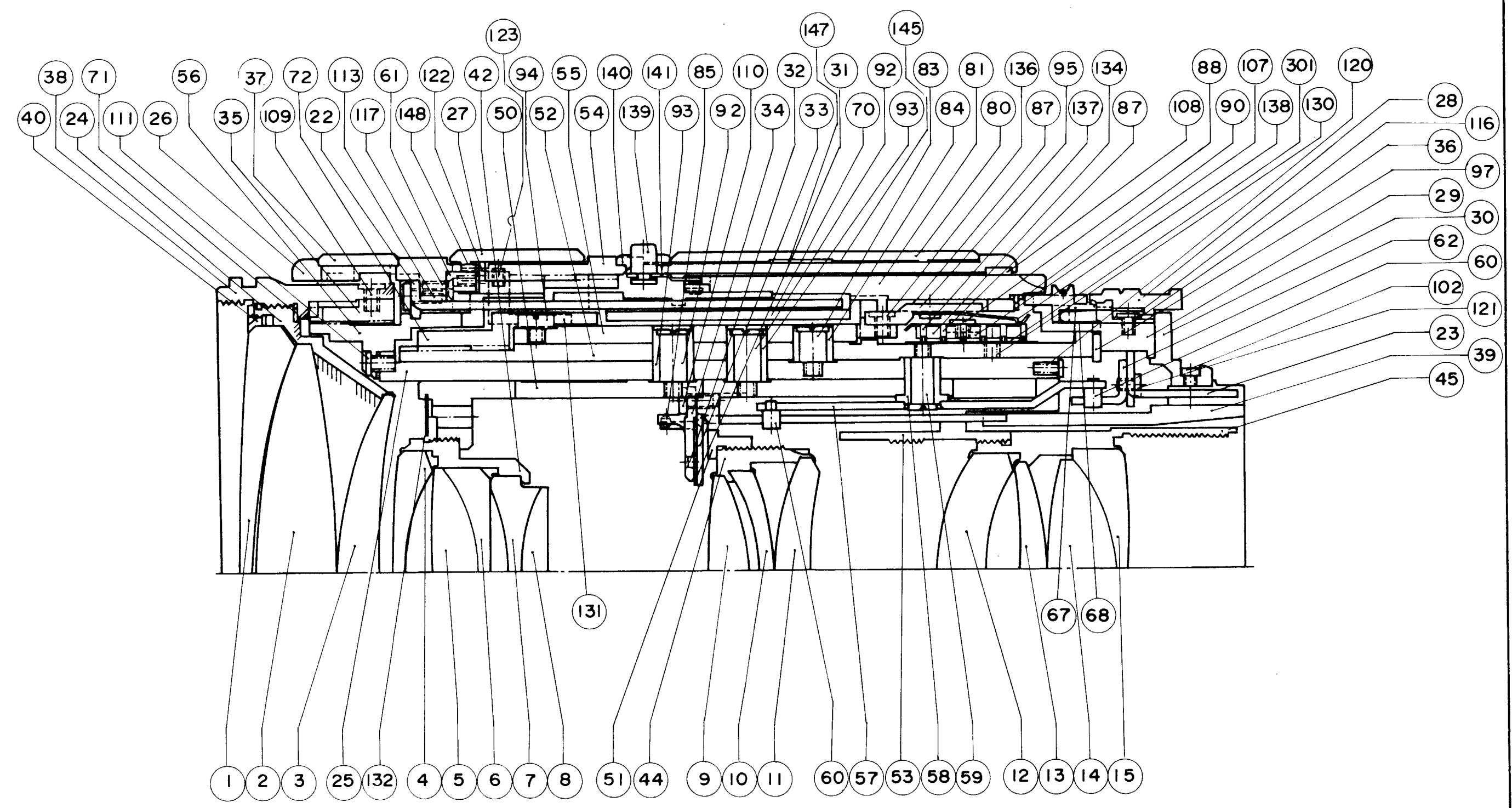


Fig. 3

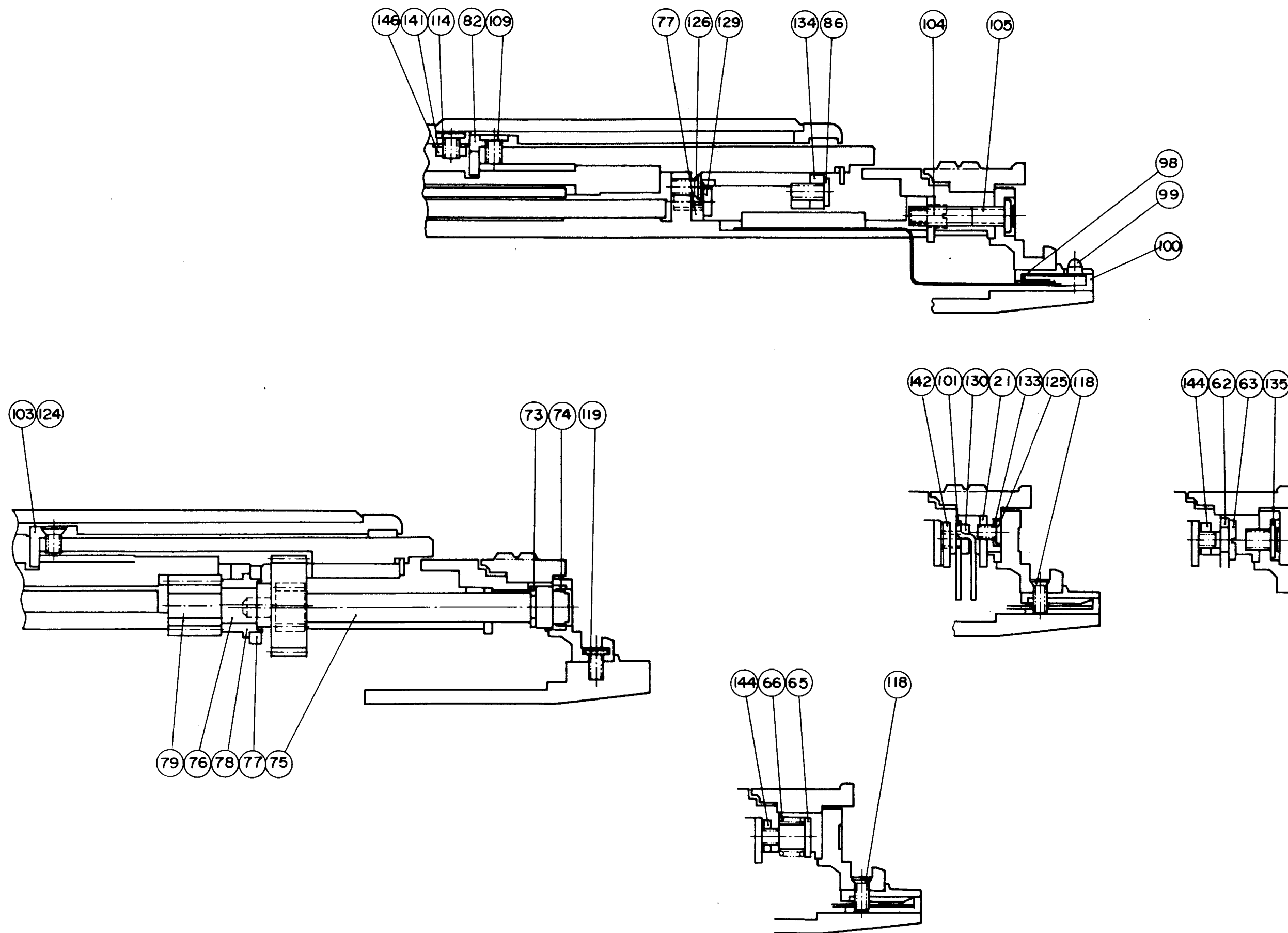


Fig. 4

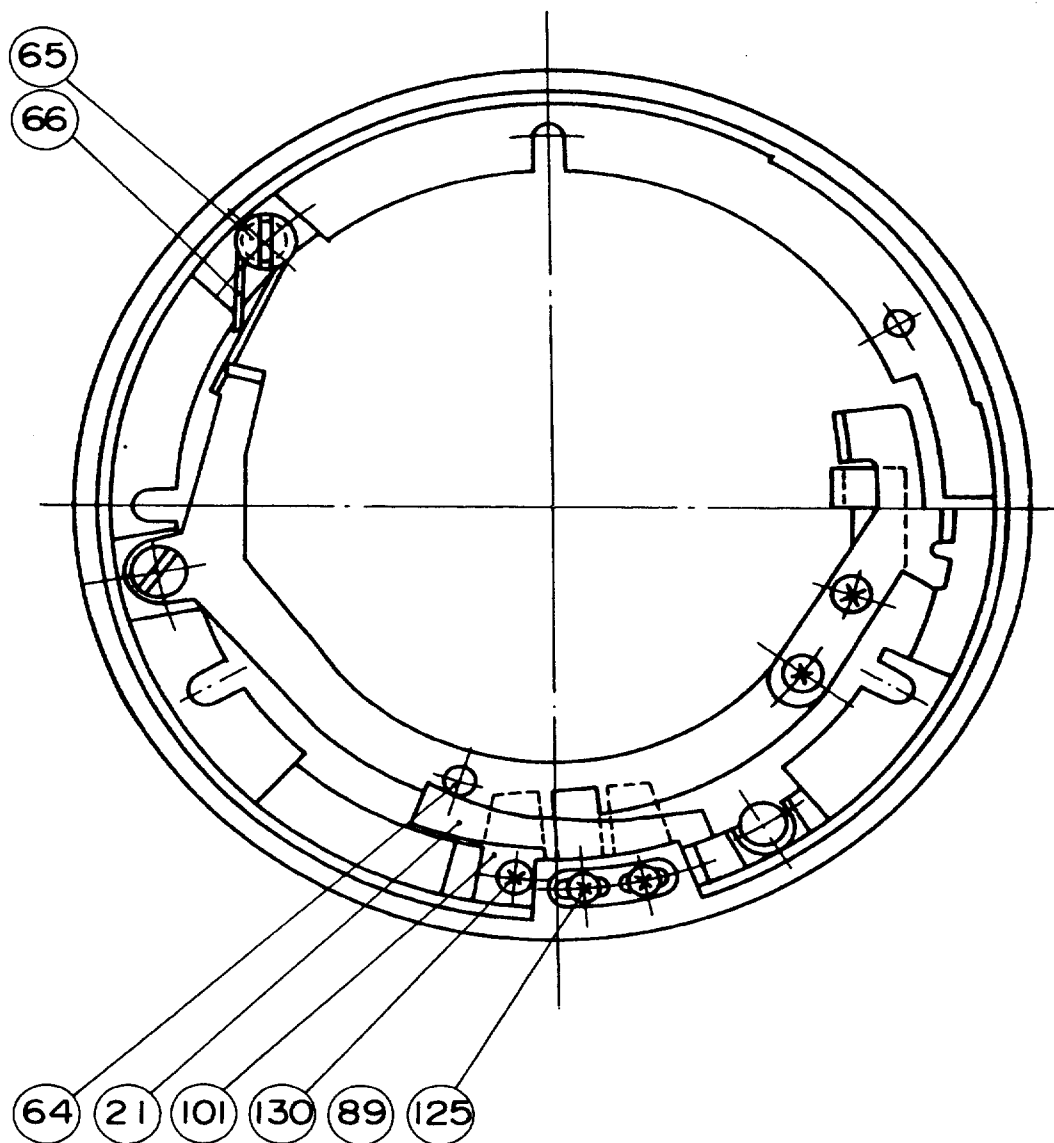
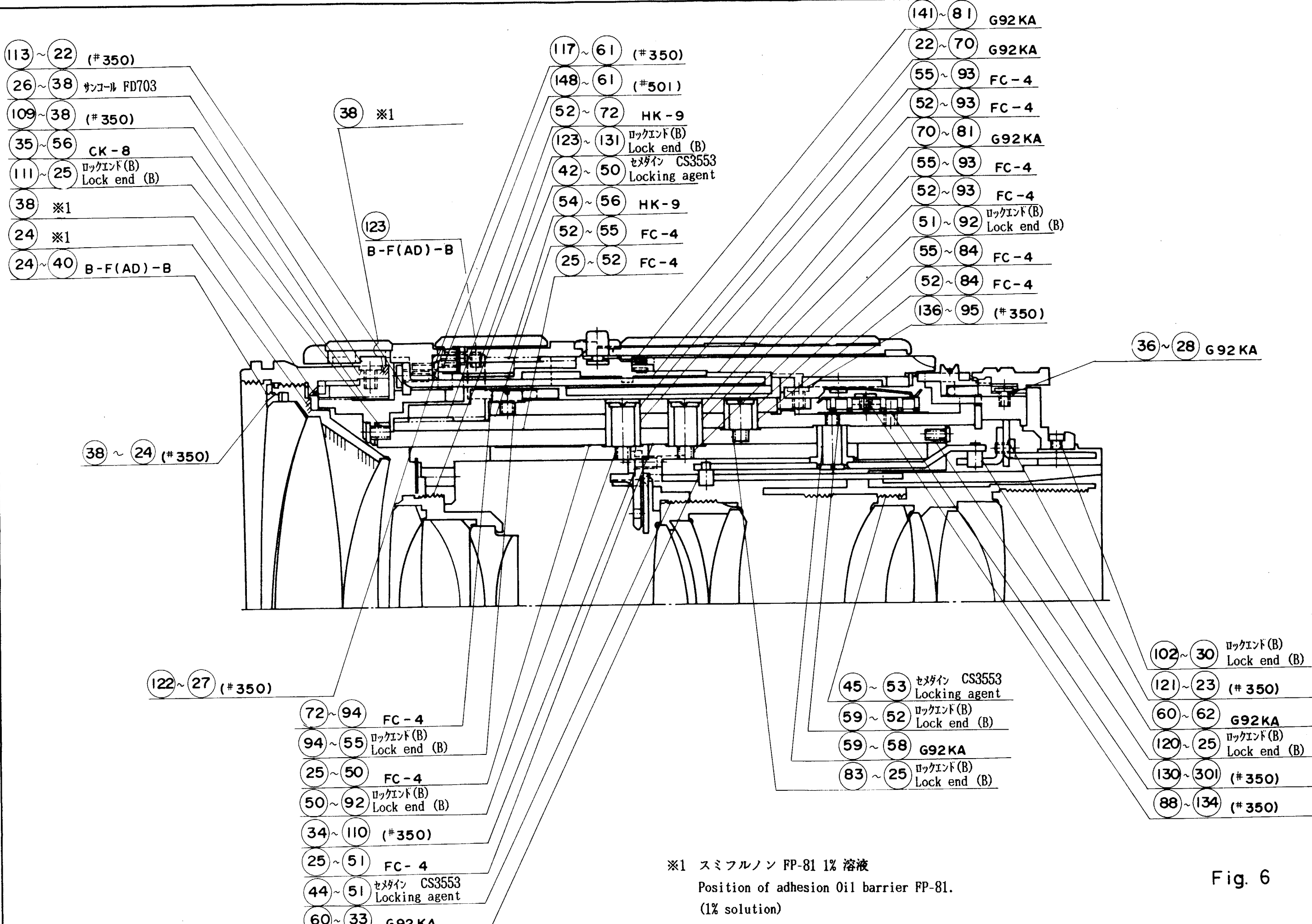


Fig. 5



※1 スミフルノン FP-81 1% 溶液
Position of adhesion Oil barrier FP-81.
(1% solution)

Fig. 6

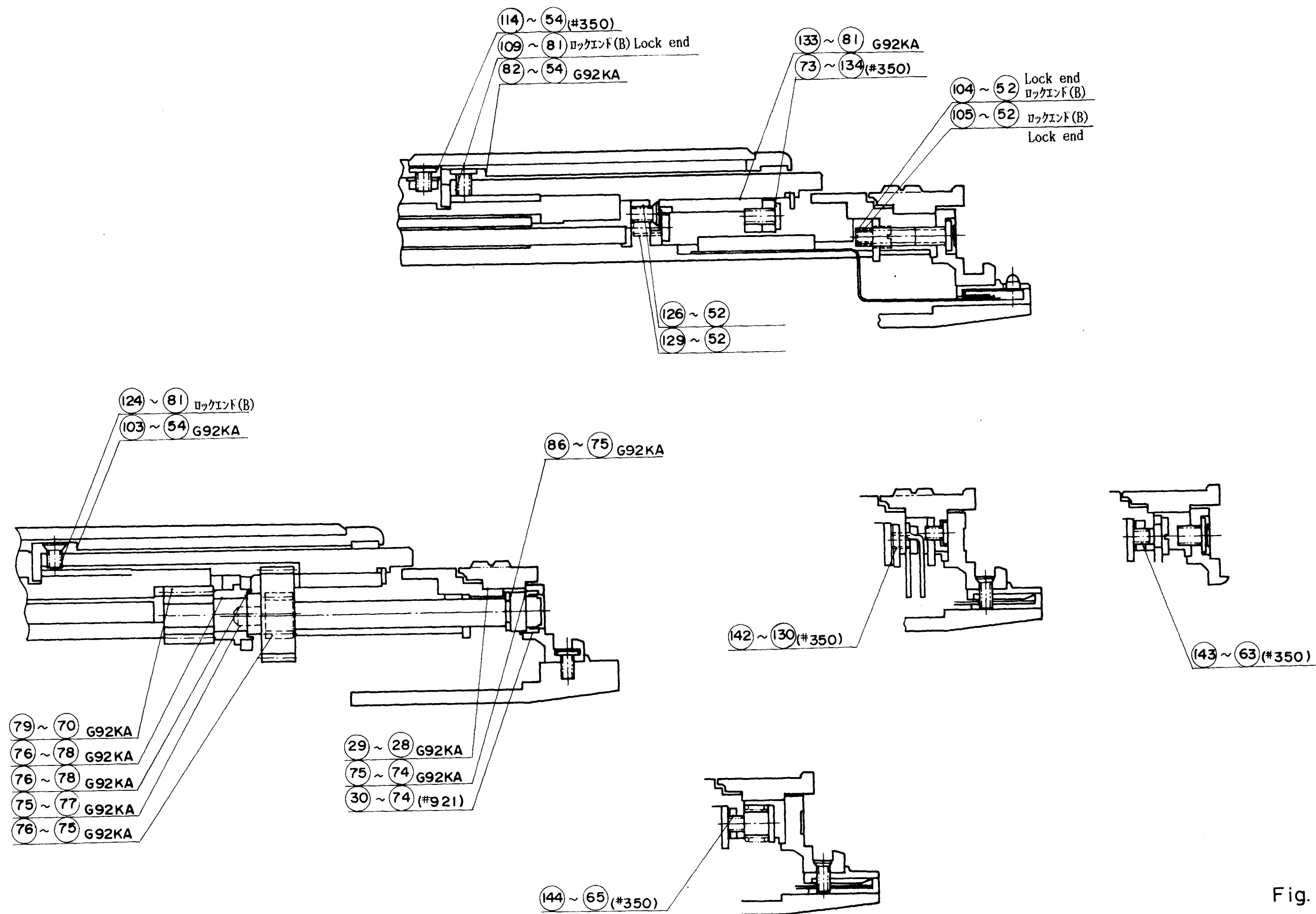


Fig. 7

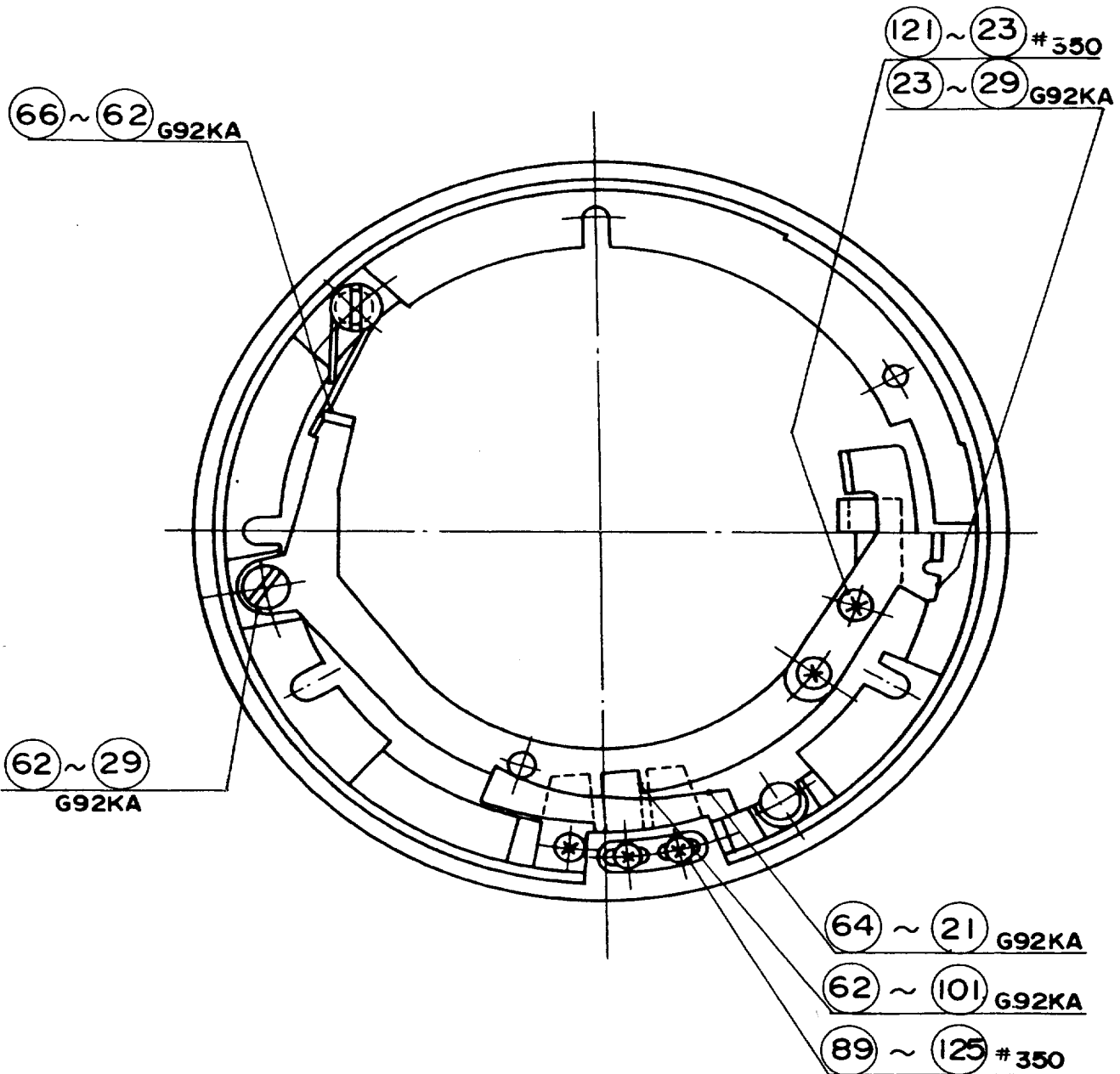
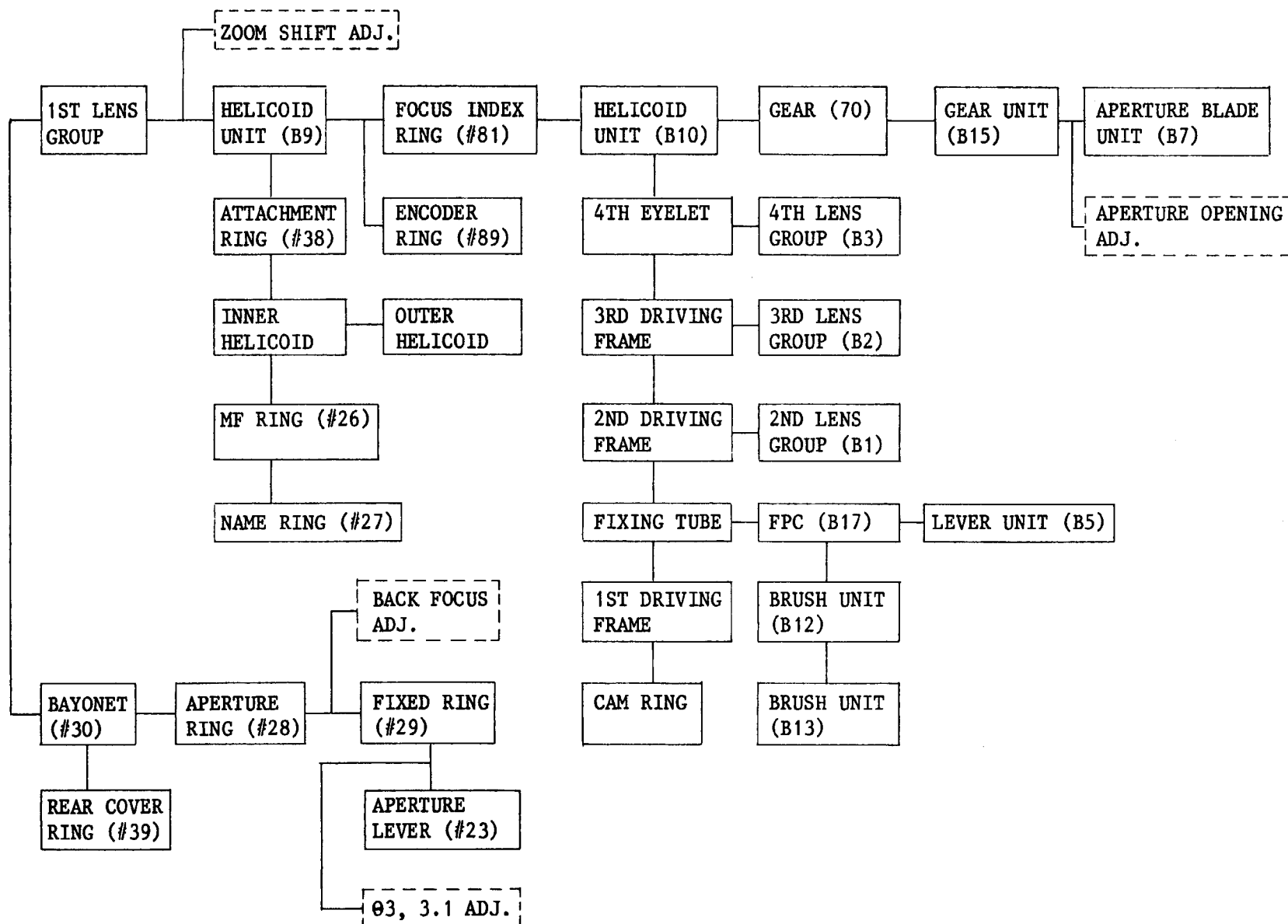


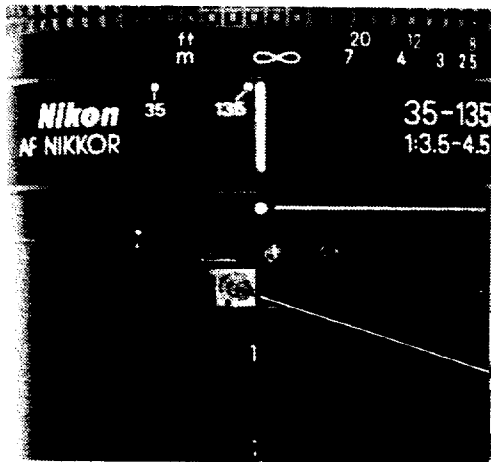
Fig. 8

7. DISASSEMBLING

DISASSEMBLING PROCEDURE CHART

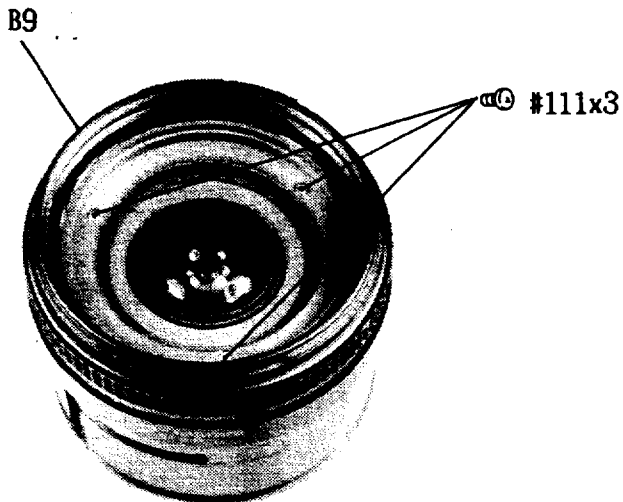


DISASSEMBLING



#82x2

1st lens group



Rubber ring #80

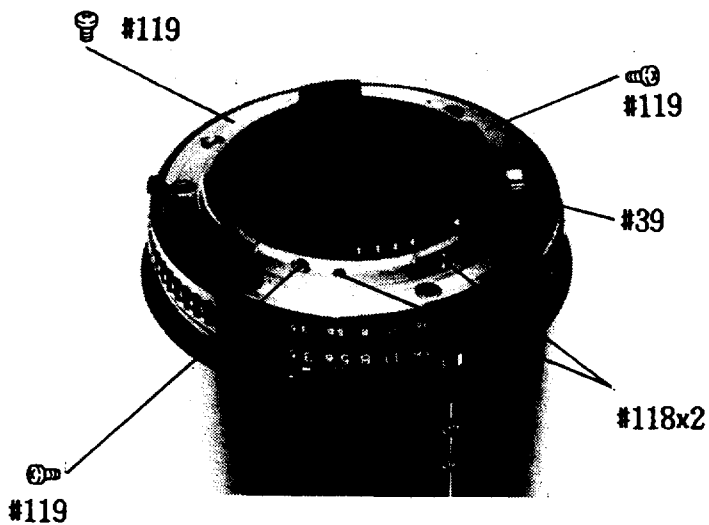
Plate #145x2

Block #82x2
Screw #124, #109

1st lens group unit

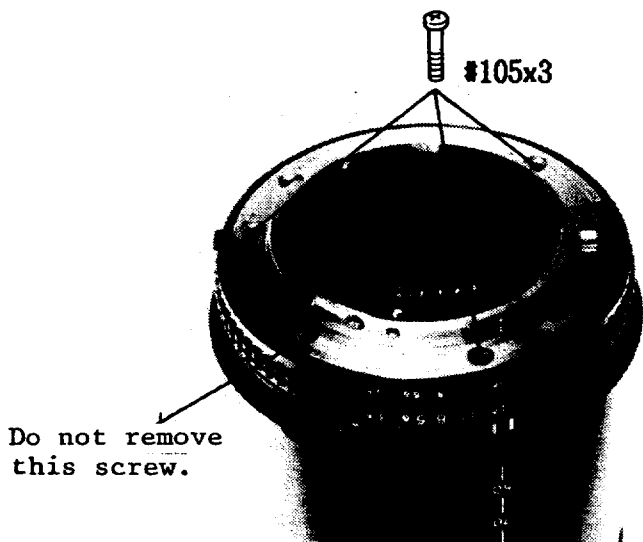
Screw #111x3

Helicoid unit B9 can be
taken off upward.

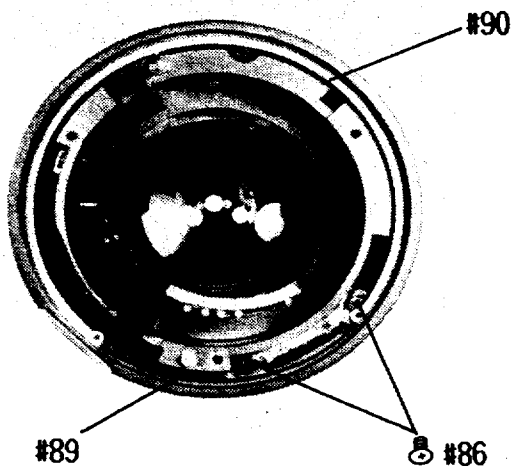


Rear cover ring #39
#119x3
#118x2

(Be careful not to damage
FPC when removing rear
cover ring.)



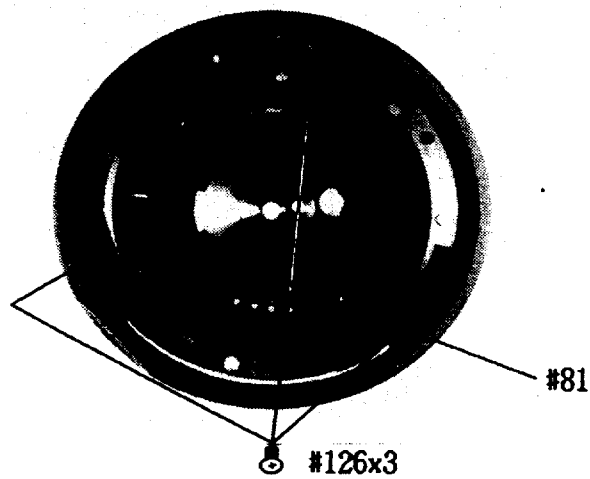
Bayonet, Aperture ring
#105x3



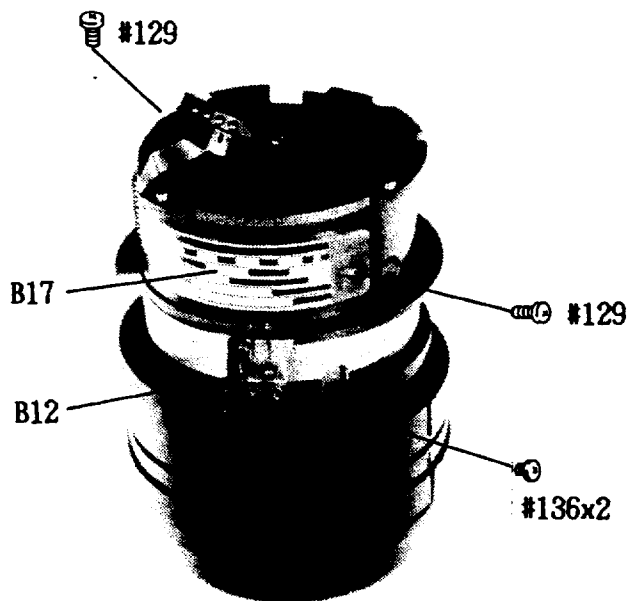
Ring #90

Encoder brush B13
#86x2

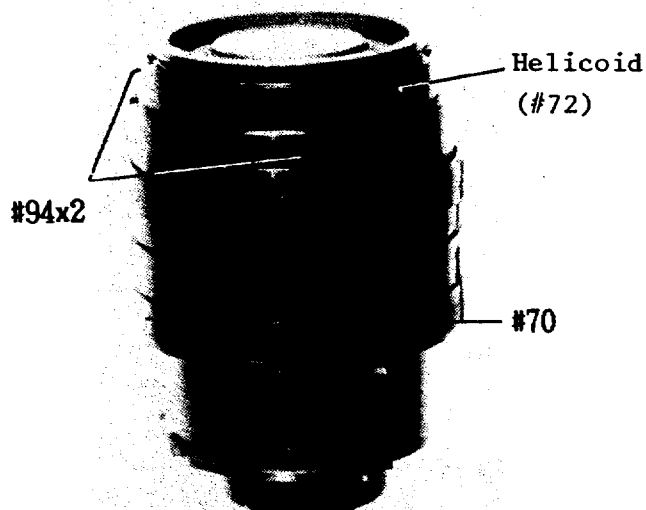
Encoder ring #89



Focus index ring #81
#126x3



FPC B17
#129x2

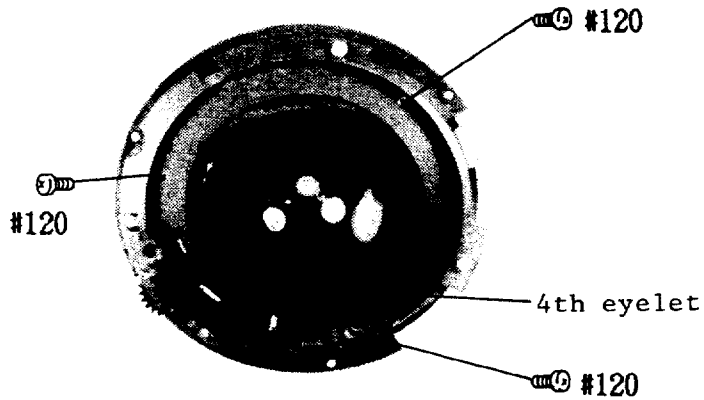


Brush unit B12
#136x2

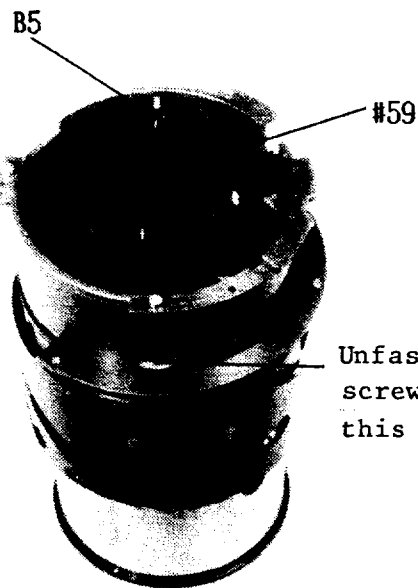
Macro helicoid
#94x2

Make sure of the position
of macro helicoid.

Gear #70

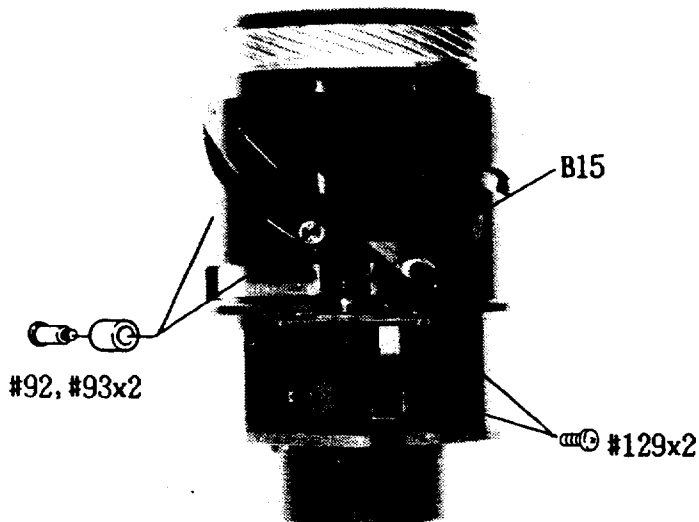


4th eyelet
4th lens group B3
#120x3



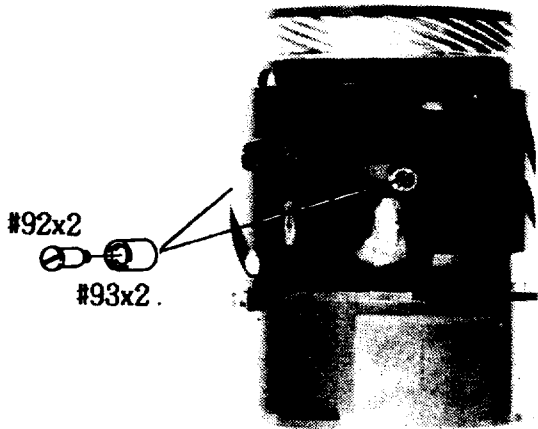
Lever unit B5
#59
(Refer to left figure.)

Unfasten screw with
screwdriver through
this hole.

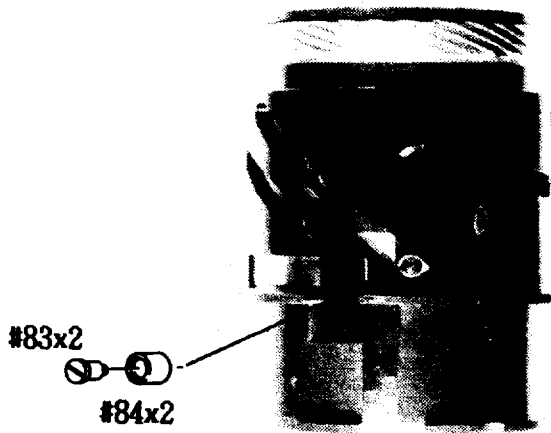


Gear unit B15
#129x2

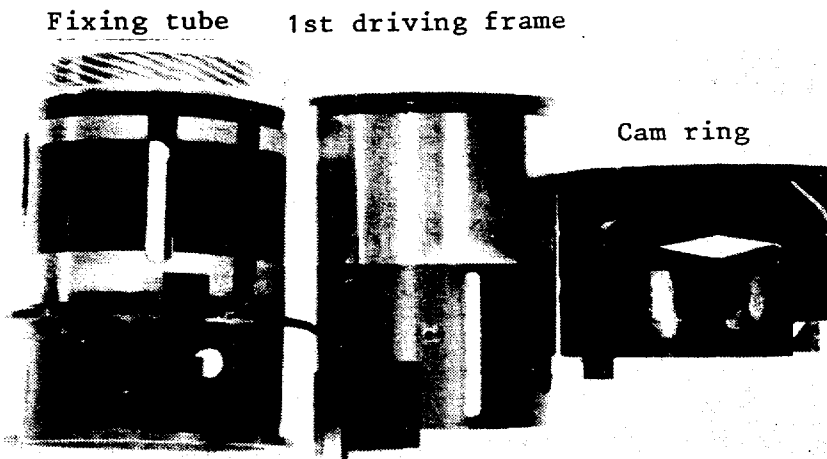
3rd driving frame
3rd lens group B2
Aperture operating parts
#92x2
#93x2



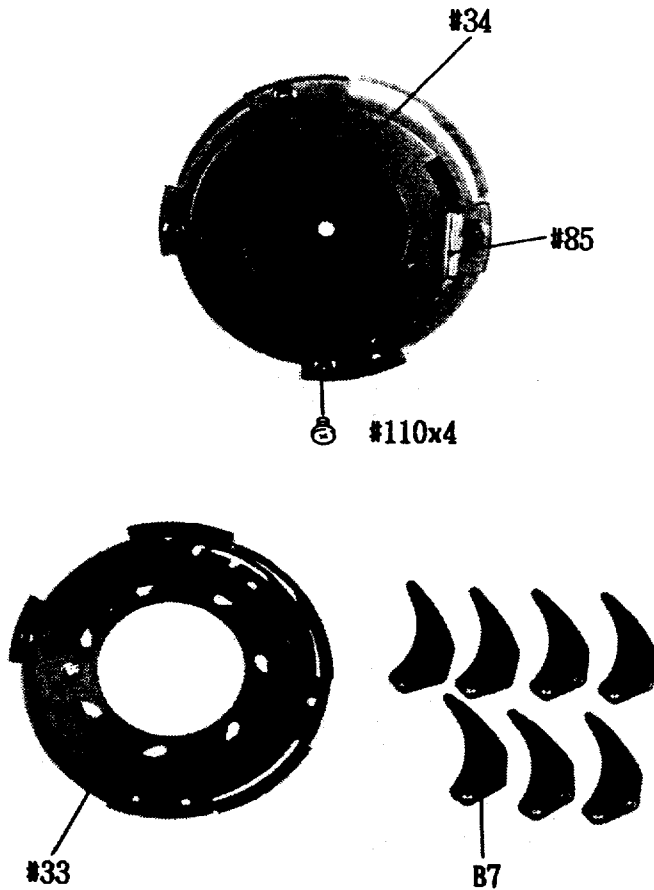
2nd driving frame
2nd lens group B1
#93x2
#92x2



Fixing tube
1st driving frame
Cam ring
#84x2
#83x2
Leaf spring #127x2



Aperture operating parts



Blade mounting plate #34
#110x4, #85

Aperture blade unit B7x7

Blade actuating ring #33

Installation:

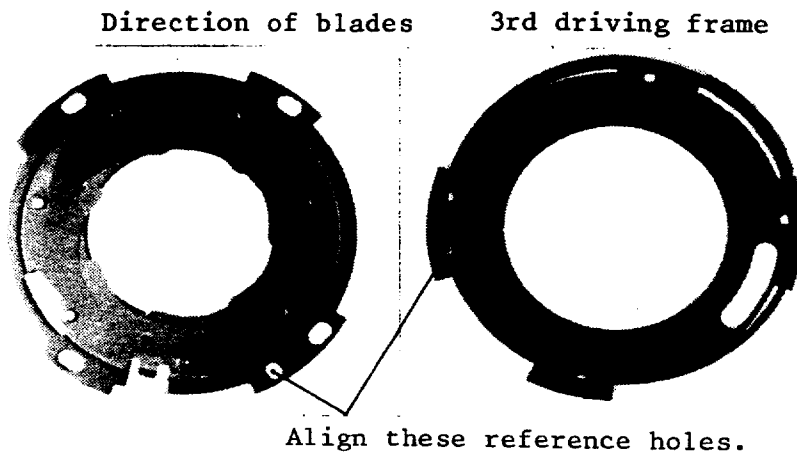
Set aperture blades as
shown in the figure.

Mount aperture actuating
plate.

Align the holes and mount
3rd driving frame.

After adjusting aperture
opening and 3.1, fasten
#110x4 and #85.

Check operation of
diphragm.



Helicoid unit

Attachment ring

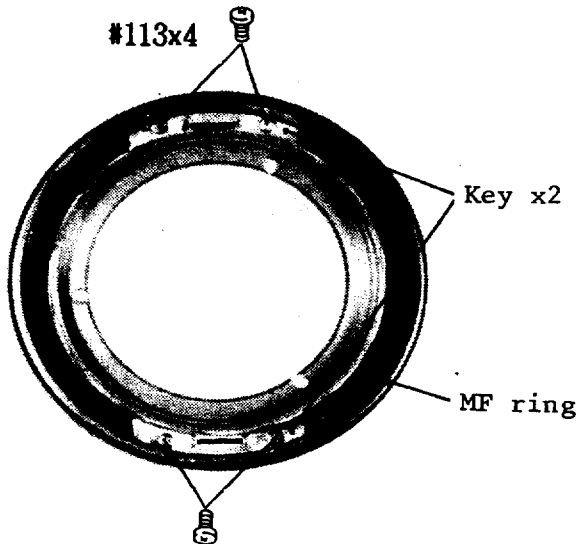
#109x3



Helicoid (#35)

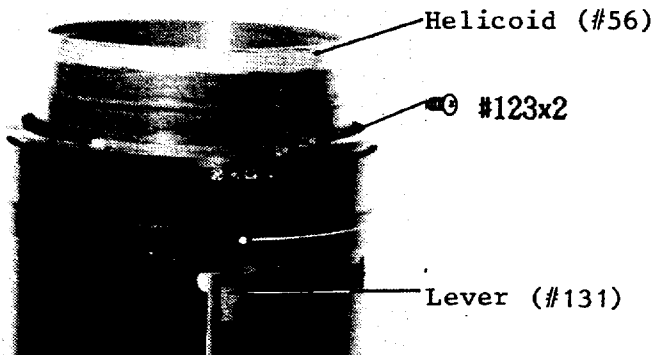


#113x4



Key x2

MF ring



Helicoid (#56)

#123x2

Lever (#131)

Rubber ring #37

Attachment ring #38
#109x3

Hold attachment ring with
your fingers to take it
off.

Helicoid #35
* Make sure of the
position.

MF ring #26
Key #22x2
#113x4

Name ring #27
#122x3

Lever #131
#123x2

Helicoid #56
* Make sure of the
position.

8. ASSEMBLING AND ADJUSTMENT

Fixing tube, 1st driving frame, Cam ring

Refer to page 45.
Adhere #84x2 with Lock End.

2nd driving frame, 2nd lens group

Refer to page 45.
Adhere #93x2 with Lock End.
* 2nd driving frame is not directional.

3rd driving frame, 3rd lens group

Refer to page 44.
Adhere #93x2 with Lock End.

Aperture operating parts

Refer to page 46.
Adhere #110x4 with Screw Lock.

Lever unit, Gear unit

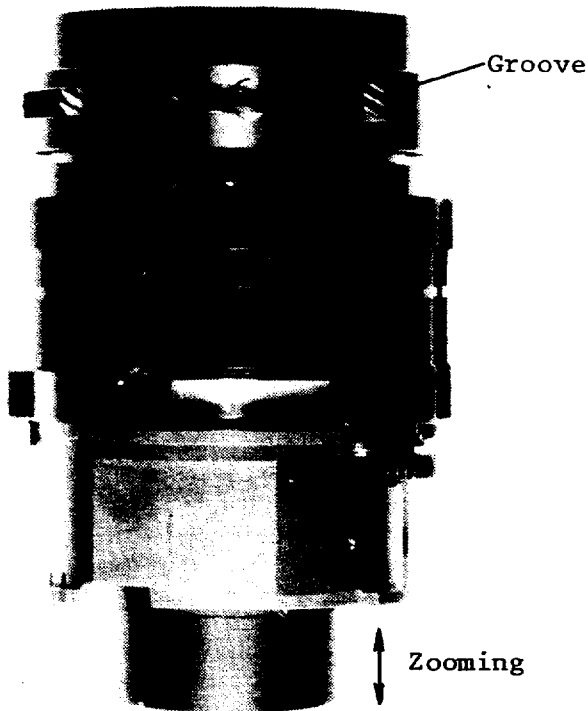
Refer to page 44.
Adhere #129x2 with Screw Lock.
Adhere #59 with Lock End.

4th eyelet, 4th lens group

Refer to page 44.
Adhere #120x3 with Lock End.

Helicoid (#72), Focus gear

Mounting position

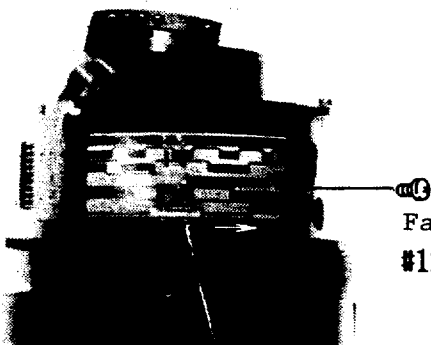


Mount helicoid (#72)
as shown in the figure.

#94x2

* Helicoid should not be
moved by zooming.
If faulty, lubricate and
adjust.

FPC brush unit



Fasten first.

#129x2 (Screw Lock)

#136x2 (Screw Lock)

FPC B17

#129x2

Fasten a screw indicated
in the figure first.

Then, fasten the other
screw while stretching
FPC.

Brush unit B12

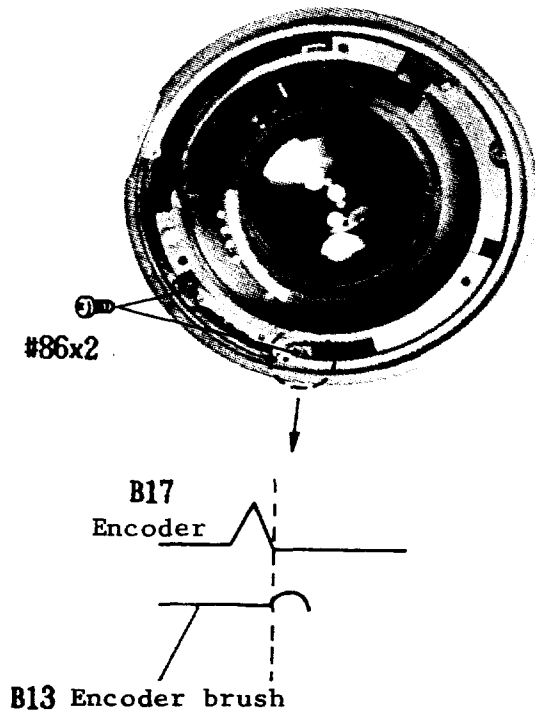
#136x2

* Fasten brush unit while
pushing it in the arrow
direction.

Focus index ring

Refer to page 43.

Encoder brush



Encoder ring #89

Encoder brush B13
Adhere #86x2 with Screw
Lock.
Adjust #86 so that the
brush is at the position
indicate in the figure
when Macro helicoid unit
is drawn to the mount
side.

C ring

Refer to page 42.
Be sure to adhere with
Screw Lock after
installation.
(two portions)

Bayonet, Aperture ring

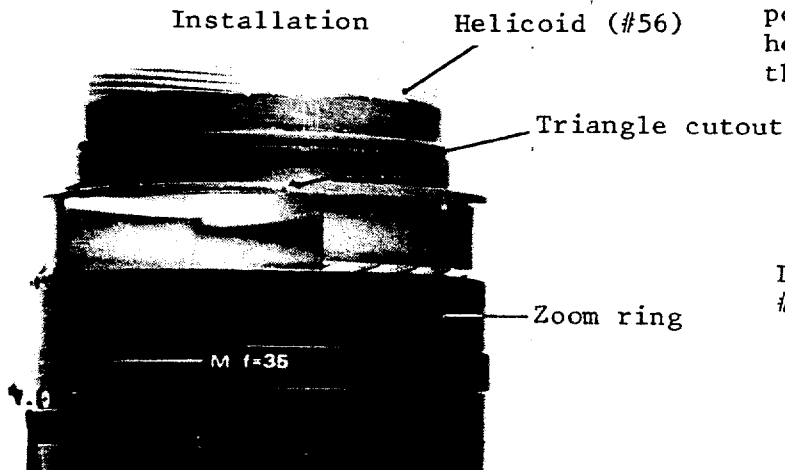
#105x3
Use Lock End.

Rear cover ring

#119x3
#118x2

Helicoid unit

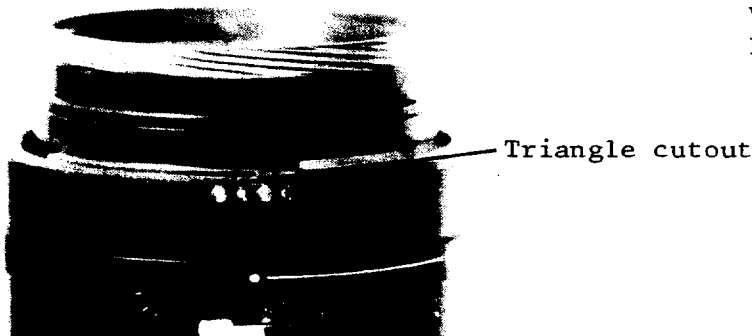
Installation



Adjust the mounting position of zoom ring and helicoid (#56) as shown in the figure.

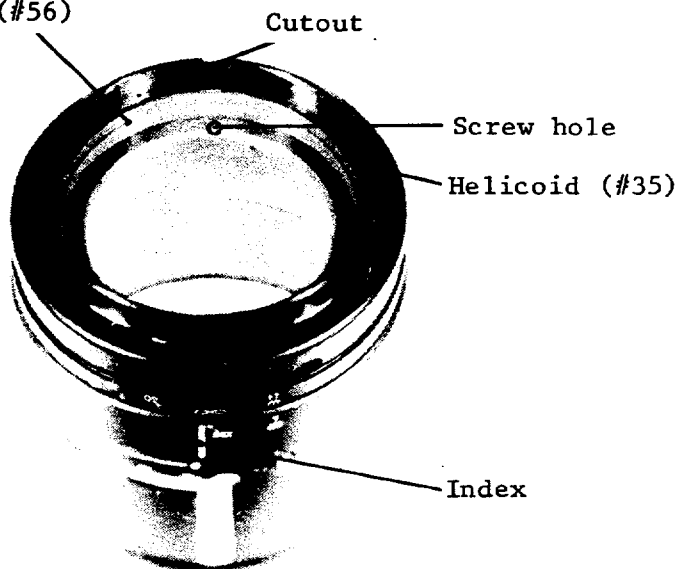
Lever #131
#123x2

Inspection



The triangle cutout should be at the position indicated in the figure when helicoid #56 is fully pushed.

Helicoid (#56)



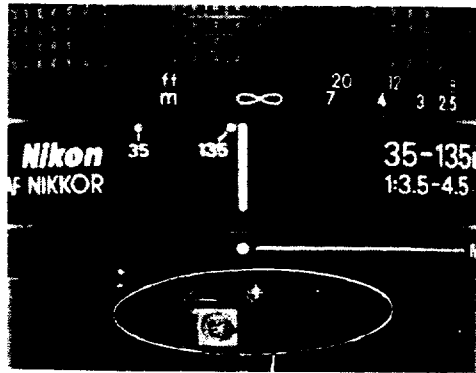
Align cutout, screw hole and index when mounting helicoids #35 and #56.

Name ring #27
#122x3

MF ring #26

Attachment ring #38
* Refer to page 47.

Mount helicoid unit.
#111x3



Mount 1st lens group.

Inspect zooming operation.

When mounting block #82, adjust countersunk-head screw first to make the reference, then pan-head screw.

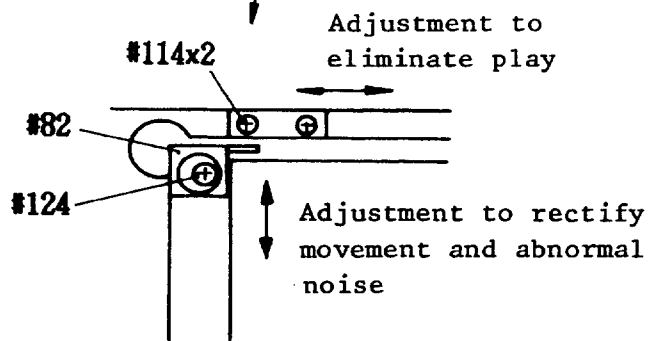


Plate #145x2

Rubber ring

Adjustment of zooming focus deviation and lens back focus

Zooming focus deviation adjustment

- 1) Set the focusing ring at the infinity.
- 2) Investigate the difference of Metal Back Focus at wide setting (35mm) and telefoto setting (135mm) using the table below (B). Then, adjust washers in 1st lens group.
- 3) Measure the above-mentioned difference two or three times. If it is inside the standard, adjustment of zooming focus deviation is completed.

Lens back focus adjustment

- 4) Adjust washer #97.
 Standard: 135mm setting -0.1 - +0.25
 35mm setting -0.05 - +0.01

* Decrease washer to shift the back focus at 135mm setting to positive side and increase washer to shift to negative side.

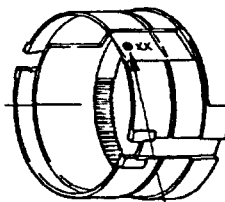
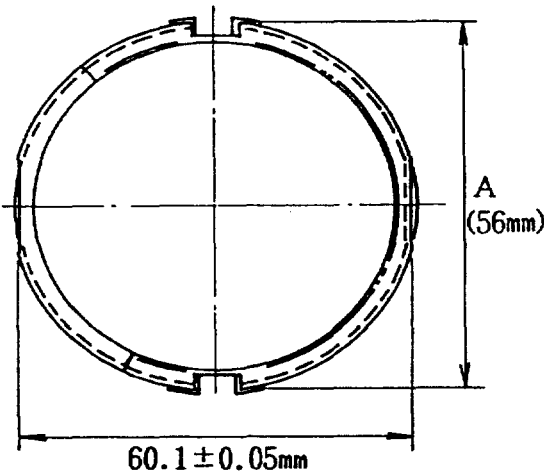
A. 1st group washer	B. Difference between W & T	C. Change of back focus
0.01	0.033	0.003
0.02	0.066	0.005
0.03	0.099	0.008
0.04	0.132	0.011
0.05	0.165	0.014
0.06	0.198	0.016
0.07	0.231	0.019
0.08	0.264	0.022
0.09	0.297	0.024
0.10	0.330	0.027
0.11	0.363	0.030
0.12	0.396	0.032
0.13	0.429	0.035
0.14	0.462	0.038
0.15	0.495	0.041
0.16	0.528	0.043
0.17	0.561	0.046
0.18	0.594	0.049
0.19	0.627	0.051
0.20	0.660	0.054
0.21	0.693	0.057
0.22	0.726	0.059
0.23	0.759	0.062
0.24	0.792	0.065

SUPPLEMENT FOR ADJUSTMENT

1. Movement of focusing ring is not smooth.

Cause: Focus gear #70 does not have accurate roundness.

Repair: Measure the diameter of focus gear. If it is not correct, adjust it with solder iron.



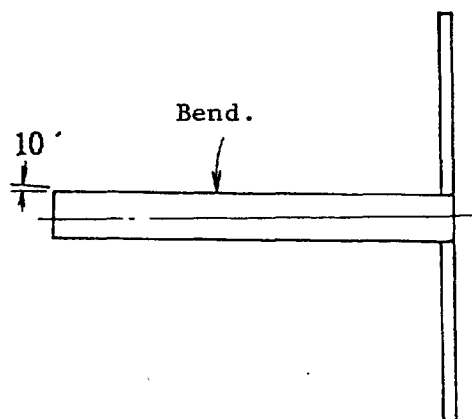
- 1) Hold the focus gear with slide calipers to adjust the diameter A to 56mm.
- 2) Touch solder iron to the part indicated in the figure.

* If deformation is serious, move solder iron in the direction indicated by "XX".

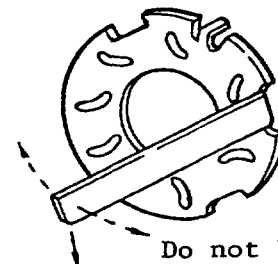
2. Aperture opening is changed by zooming.

Cause: Bend of aperture actuating plate is not correct.

Repair: Change the bending angle from 40' to 10'.



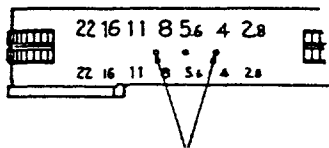
Aperture actuating plate



Bend. Do not bend in this direction.

* Do not bend inside or outside to prevent irregular zooming operation.

2. Attching meter coupling shoe



Make holes on these
two concave portions.

- 1) Attaching meter coupling shoe
 - a. Unfasten screws (#84x5) to remove bayonet mount unit.
 - b. Take out aperture ring (#28).
 - c. Make two holes ($\phi 1.1$) on the concave portion of aperture ring. (Refer to the figure.)
 - d. Attach meter coupling shoe.

Note: The meter coupling shoe is to be mounted with a 15' difference from the normal position due to the internal mechanism of the lens. Accordingly, the following problems may arise:

- * The aperture scale is shifted in a non-AI viewfinder.
- * Underexposure by about 1/30EV may occur.
- * The position of the meter coupling shoe is shifted from the f/5.6 mark.
- * The position of the holes in the meter coupling shoe and the numbers on the aperture scale do not correspond.

- e. Reassemble aperture ring (#28) and bayonet mount unit in the reverse order.

Necessary part:

Meter coupling shoe (1K406-029)x1
Screw (1K010-002-1)x2