ETR / ZENZANON 75mm Lens

Repair Manual

	Trouble	Cause	Remedy	
1	Poor synch conductivity	(1) Shutter green cord is poorly soldered.	o Resoldering	P14
		(2) Contact piece, insulating plate are poorly connected.	o Replace contact piece and insulating plate set.	P13,14
		(3) Shutter green cord is broken.	o Replace shutter	P9∿12 (S)
2	Synch is poorly insulated	(1) Flux was incompletely wiped when contact piece and insulating plate set and shutter were soldered.	o Wipe flux with lens cleaning paper or similar articles using ether-mixed alcohol and coat silicon varnish.	P14
		(2) After wiping flux, silicon varnish was not coated.	o Wipe lightly with in ether-mixed alcohol and coat silicon varnish.	P14
		(3) Shutter itself is poorly insulated.	o Replace shutter.	P9∿12 (S)
		(4) Contact piece and insulating plate set itself is poorly insulated.	o Replace contact piece and insulating plate set.	P13,14
3	Diaphragm resistance value insecure	(1) Warped printed circuit (PCB) board of diaphragm resistance.	o Replace shutter	P9∿12 (S)
		(2) Dirty back of printed circuit board of diaphragm resistance.	o Clean back of printed circuit board with ether-mixed alcohol.	P17
		(3) Broken brush legs of printed circuit board of diaphragm resistance.	o Replace shutter	P9∿12 (S)
		(4) Poor connection of contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
		(5) Improper angle of brush at the back of printed circuit board of diaphragm resistance.	o Correct brush angle	P17

(1) Note: (s) indicates satndard manual.

	Trouble	Cause	Remedy	
4	Diaphragm resistance value is not shown	(1) Dirty contact piece and insulating plate set and shutter contact.	o Clean with ether-mixed alcohol solution	P13
		(2) Broken wire in contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
		(3) Broken wire in shutter white cord.	o Replace shutter.	P9∿12 (S)
5	Short circuit of diaphragm resistance value	(1) Short circuit in shutter white cord.	o Replace shutter.	P9∿12 (S)
		(2) Short circuit in contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
6	Diaphragm resistance values become improper values.	(1) Short circuit in contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
		(2) Short-circuit of wirings inside the shutter.	o Replace shutter.	P9∿12 (S)
7	Shutter releasing speed skips intermittently.	(1) Deformed base plate of set ring.	o Replace set ring unit.	P10
		(2) Poor movement of set ring unit.	o Replace set ring unit.	P10
		(3) Dirty contact piece and insulating plate set and shutter contact.	o Clean with ether-mixed alcohol.	P13
		(4) Poor connection of contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
		(5) Defective shutter.	o Replace shutter	P9∿12 (S)
8	Shutter speed of one second is variable.	(1) Defective shutter.	o Replace shutter.	P9∿12 (S)
9	Shutter speed, 1/250, 1/125 slightly slow or faster.	(1) Defective shutter.	o a) Volume adjustment inside shutter b) If impossible, replace shutter.	(S) 23,24

	Trouble	Cause	Remedy	
10	Shutter speed skips.	(1) Poor soldering of shutter and contact piece insulating plate set.	o Resoldering etc.	P14
		(2) Short-circuit of wiring inside the shutter.	o Replace shutter	P9∿12 (S)
		(3) Sticky operation of set ring unit.	o Replace set ring unit.	P10
		(4) Deformed set ring base plate.	o Replace set ring unit.	P10
		(5) Poor connection of contact piece and insulating plate set.	o Replace contact piece and insulating plate set.	P13,14
		(6) Dirty contact piece and insulating plate set and shutter contact.	o Clean contact with ether-mixed alcohol.	P13
11	Shutter speed, 1/250, 1/125 are variable.	(1) Defective shutter	o a) Volume adjustment inside shutter.	(S) 23,24
			b) If impossible, replace shutter.	P9∿12 (S)
12	Shutter speed 1/500 slow, fast or varies	(1) Defective shutter	o Replace shutter	P9∿12 (S)
13	Shutter speed skips every other time	(1) Defective shutter	o Replace shutter	P9∿12 (S)
14	Poor feeling in moving out or in of helicoid, unstable rotation	(1) Poor tightening of set screws in installing helicoid and scale.	o Redo tightening of set screws.	(S) 29,30
		(2) Poor tightening of scale ring after mechanical focus adjustment.	o Redo tightening of scale ring.	(S) 28
		(3) Poor installation of straight plate.	o Correct installation of straight plate.	P15,16
		(4) Defective straight plate.	o Replace straight plate.	P15,16
		(5) Poor helicoid at lead screw portion	o Replace helicoid.	P9∿12 (S)
15	Poor feeling in moving out or in helicoid.	(1) Por helicoid at lead screw portion.	o Replace helicoid	P9∿12 (S)
	o Uneven rotation	(2) Foreign matter in lead screw of helicoid.	o Clean lead screw portion	P15,16

	Trouble	Cause	Remedy	
16	Poor feeling in moving out or in helicoid. o Loose rotation	(1) Poor installation of straight plate.	o Correct installation of straight plate.	P15,16
		(2) Defective straight plate.	o Replace straight plate.	P15,16
17	Poor feeling in moving out or in of helicoid. o Slant rotation	(1) Due to incorrect tightening of scale ring after mechanical focus adjustment, helicoid and scale ring are slightly expanded and cause bayonet ring to slant.	o Redo installation and tightening of scale ring.	(S) 28
18	Poor feeling in moving out or in of helicoid. o Rough rotation	(1) Helicoid is poor at lead screw portion.	o Replace helicoid.	P9∿12 (S)
		(2) Foreign matter inserted at lead screw portion of helicoid.	o Clean lead screw portion.	P15,16
19	Poor return of manual diaphragm	(1) Manual lever axis floats due to shallow countersink.	o Additional machining of countersink for manual lever, or replace.	P10
		(2) Manual lever axis slightly hits groove inside helicoid due to deep countersink.	o Replace manual lever.	P10
		(3) Manual arm of front frame unit is poor in movement due to incomplete painting and deformation.	o Replace front frame unit.	P10
		(4) Defective shutter.	o Replace shutter.	P9∿12 (S)
20	T change-over shutter does not operate.	(1) Poor connection of T change-over arm of front frame unit and shutter.	o Reassemble	(S) 12,13
		(2) Defective shutter.	o Replace shutter.	P9∿12 (S)
21	MG display keeps to light or lighted while in winding, while M switch is being inspected by timing gauge.	(1) Defective shutter.	o Replace shutter.	P9∿12 (S)

	Trouble	Cause	Remedy	
22	Shutter blades do not open at winding.	(1) Defective shutter.	o Replace shutter.	P9∿12 (S)

6. DISASSEMBLY OF 75mm LENS

1) Replacement of 75mm lens elements

[Step 1]

Remove the name ring ① with a name ring installing jig ④.

[Step 2]

Remove the front lens group ② with a pin face jig ⑤.

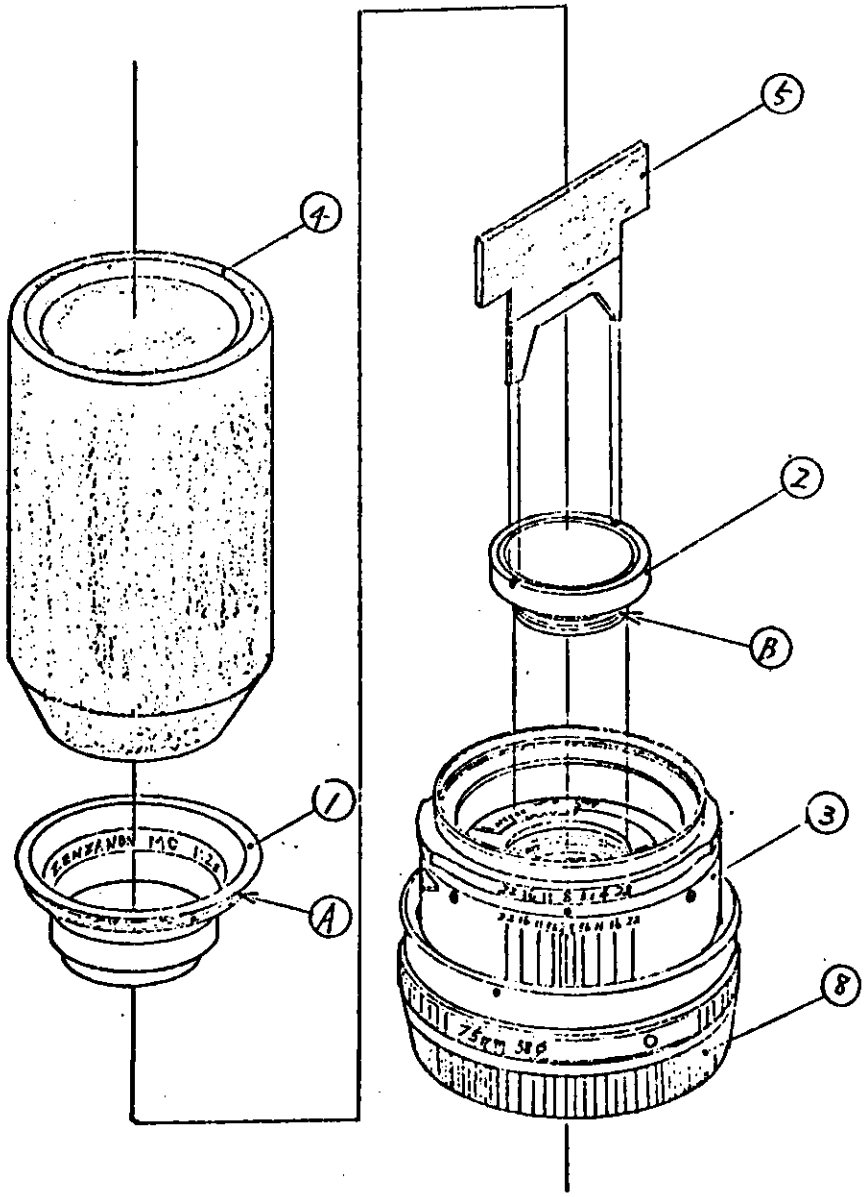


Fig. 1

[Step 3]

Remove the rear lens group ⑥ with a pin face jig ⑦.

[Step 4]

Screw in a new front lens group ② and rear group ⑥ into respective screw portions with grease (ROJIMORU #4019) coated by using pin face jigs ⑦ and ⑤.

(Note)

1. In case either front or rear group is required to be replaced, a set of front and rear group should be replaced.

2. In replacing lens elements, select a lens which conforms with a washer used between the shutter and helicoid.

Lens color indication	Washer for adjustment
Orange	0.8 t (mm)
Blue	
Yellow	0.7
Green	0.5
Purple	0.3
Red	0.1

3. Be sure to make mechanical focus adjustment after replacing lenses.

4. In replacing a front group of lens, be sure to install a rear cap ⑧.

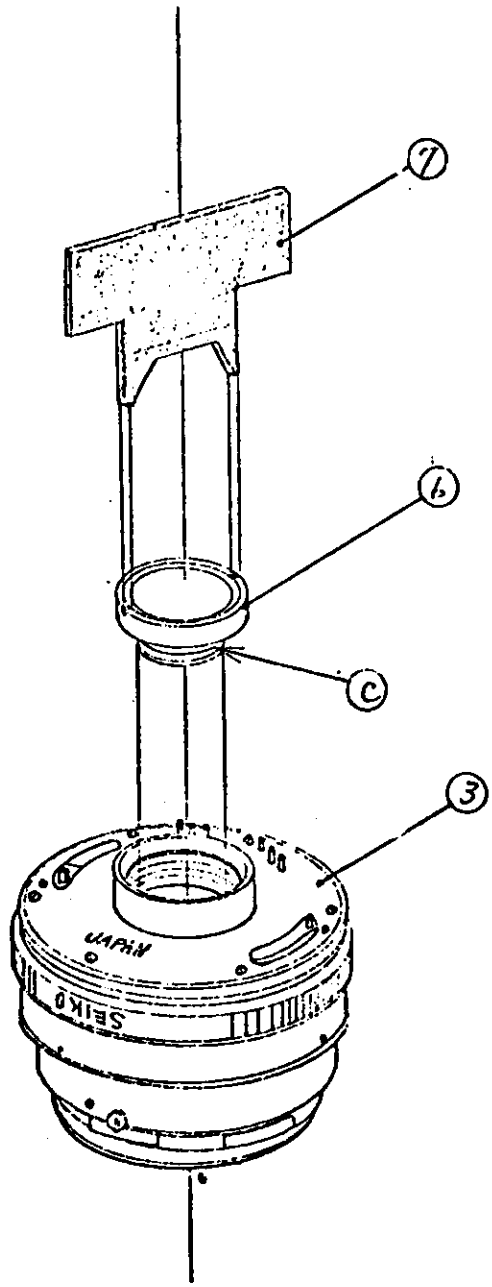


Fig. 2

8	1-242602	Rear cap
7	1-210180-AJ	Lens rear group pin face
6	1-210180	Lens rear group
5	1-210180-AJ	Lens front group pin face
4	1-210482-AJ	Name ring installing jig
3	1-710100	Helicoid installed with front and rear frame
2	1-210180	Front lens group
1	1-210482	Name ring

6. 2) Replacement of shutter

[Step 1]

Remove the name ring and lens first as described in 6.1).

[Step 2]

Remove a leatherette ring ③.

[Step 3]

Loosen set screw ⑤ and pull out the helicoid scale ②.

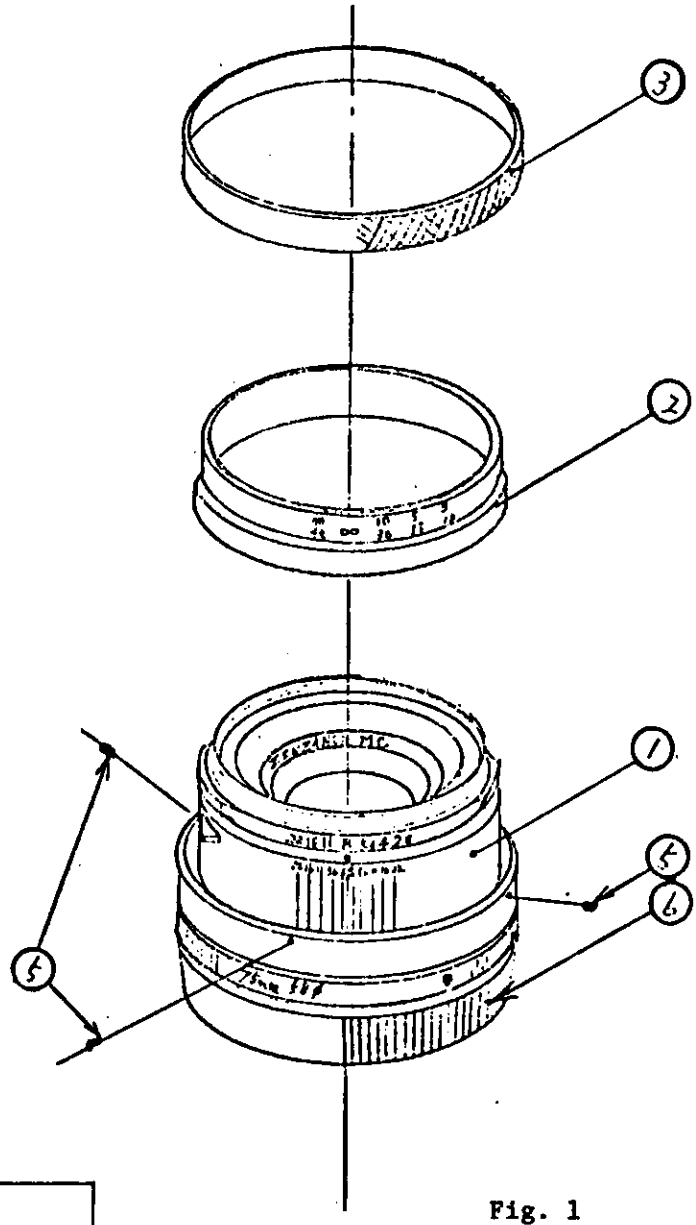


Fig. 1

6	1-242602	Rear cap
5	5-063026	Set screw
3	1-210512	Leatherette
2	1-210284	Helicoid scale
1	1-710010	Helicoid with lens assembled

[Step 4]

Remove screw (14).

[Step 5]

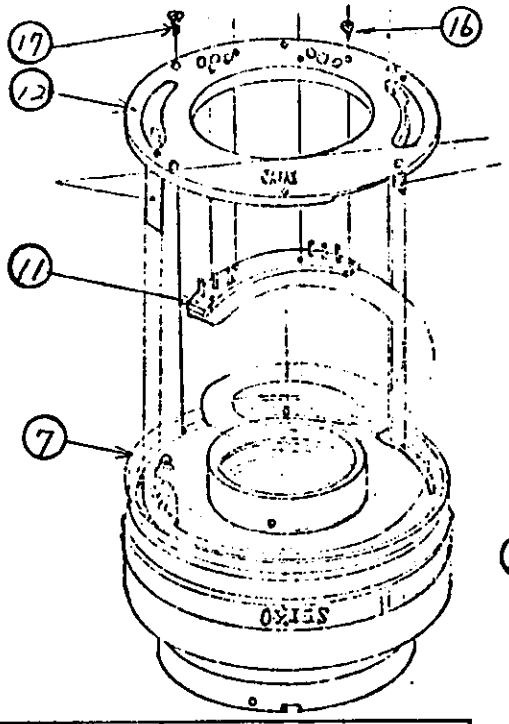
Remove the front frame unit (1), depth of field scale ring (2), manual lever set (13).

[Step 6]

Remove the light-tight ring (4) with care exercised not to bend it as it was adhesive fixed. If it is hard to remove, apply small amount of amyl acetate and remove it after a little while.

[Step 7]

Remove screws (16) and (17), and then remove the set ring unit.



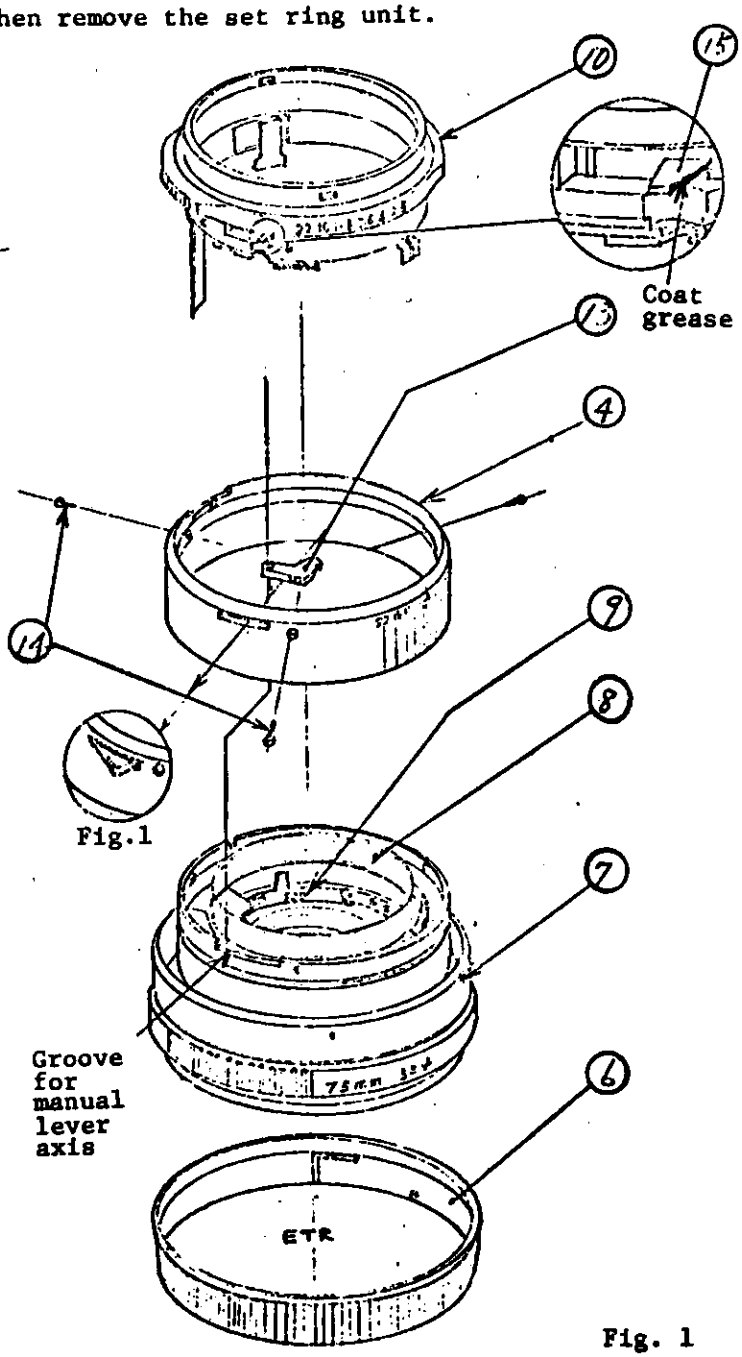


Fig.1

17	5-833407	Screw
16	5-893307	Selftap screw
15	1-210403	Manual arm C
14	5-853559	Screw
13	1-710170	Manual lever set
12	1-710220	Set ring unit
11	1-710260	Contact piece insulating plate set
10	1-710110	Front frame unit
9	1-710210	Shutter unit
8	1-210531	Light-tight ring
7	1-710200	Helicoid with shutter installed
6	1-242602	Rear cap
4	1-210295	Depth of field scale ring

Fig. 1

[Step 8]

Detach the shutter cord soldered to the contact piece and insulating plate set (11) by using a soldering iron.

[Step 9]

Set the helicoid with shutter installed (7) in the helicoid inner cylinder assembling jig (18) and remove the ring for installing shutter (21) by using a wrench for ring for installing shutter (19).

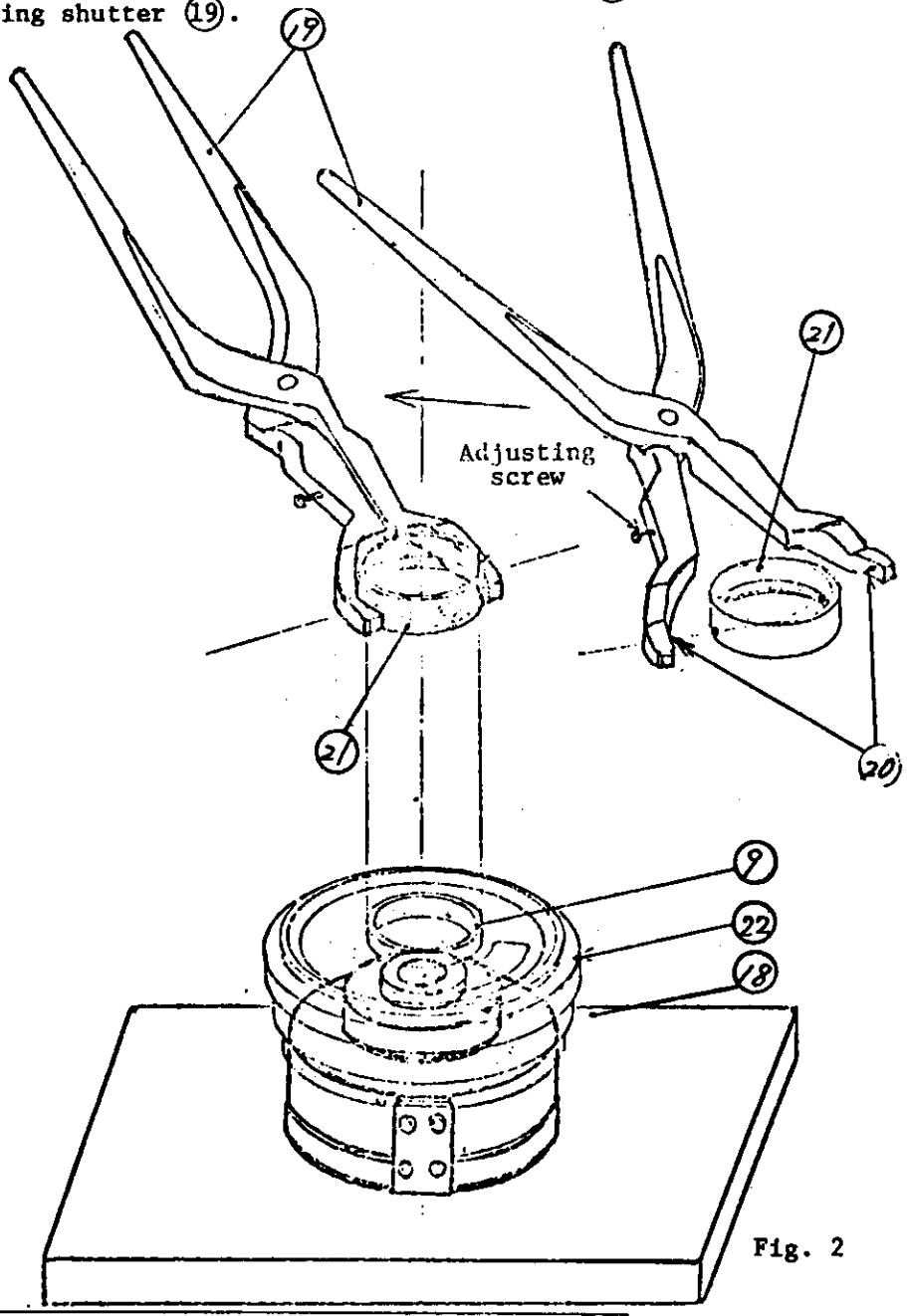


Fig. 2

22	1-710300	Helicoid unit
21	1-210152	Ring for installing shutter
20		Spanner pin for ring for installing shutter
19	1-210152 AJ	Spanner for ring for installing shutter
18	1-210013 AJ	Helicoid inner cylinder assembling jig
9	1-710210	Shutter unit

[Step 10]

Remove the shutter unit (9) from the helicoid unit (22).

[Step 11]

Replace the shutter unit (9) with a good one.

[Step 12]

After replacing a shutter unit (9), perform adjustment in accordance with the procedure set forth in the standard work instruction manual, 6-30 (excluding 8, 4 and 15).

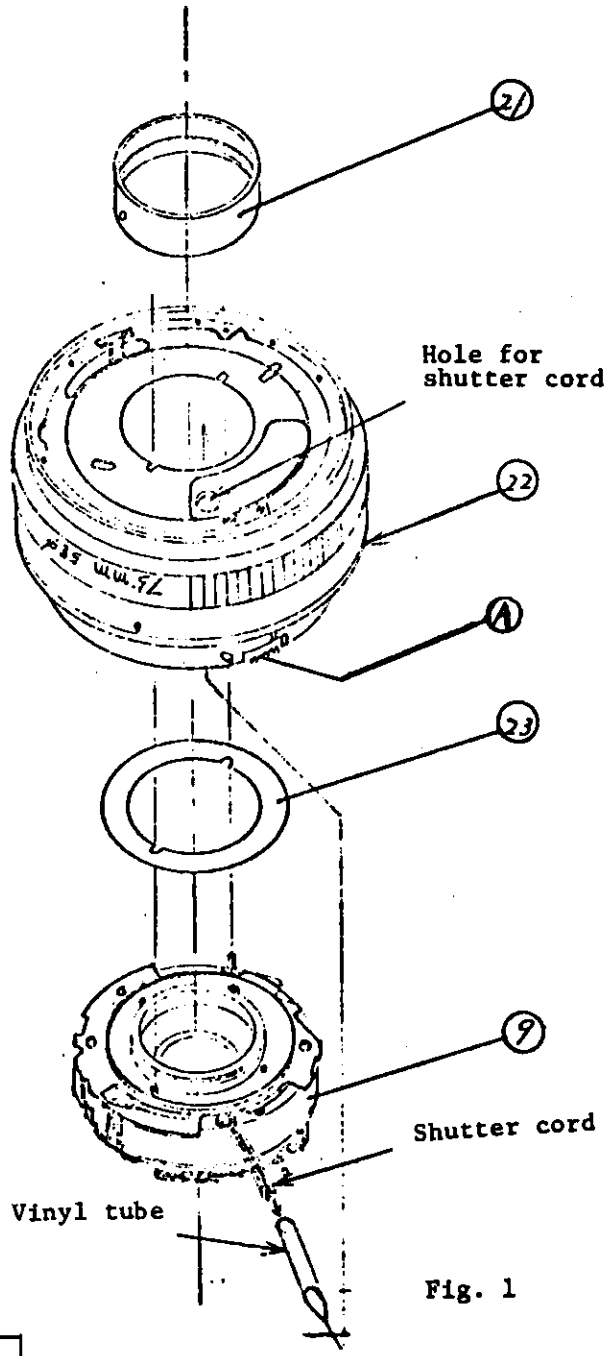


Fig. 1

23	1-210610	Washer for adjustment t 0.4
23	1-210600	" 0.3
23	1-210590	" 0.2
23	1-210171	" 0.1
22	1-710300	Helicoid unit
21	1-210152	Shutter installing ring
9	1-710210	Shutter unit

6. 3) **Replacement of contact piece and insulating plate set**

[Step 1]

Remove the set ring unit by the proceudre of 7 and 8 of Par. 6. 2), and disconnect the contact piece and insulating plate set (1) and shutter cord.

[Step 2]

Peel off the contact piece and insulating plate set (1) from the helicoid inner cylinder (3).

[Step 3]

Attach a piece of flexible fixing tape (2) to the contact piece and insulating plate set (1) by the proceudres shown in Fig. 1 and 3.

[Step 4]

Attach the contact piece and insulating plate set (1) to the helicoid inner cylinder (3) by means of flexible fixing tape (2). At this time, they must be fixed with the center of a straight plate (5) adjusted to No. 2 contact of contact piece and insulating plate set (1).
Care should be exercised to maintain a proper gap between the contact piece and insulating plate set (1) and the helicoid inner cylinder.

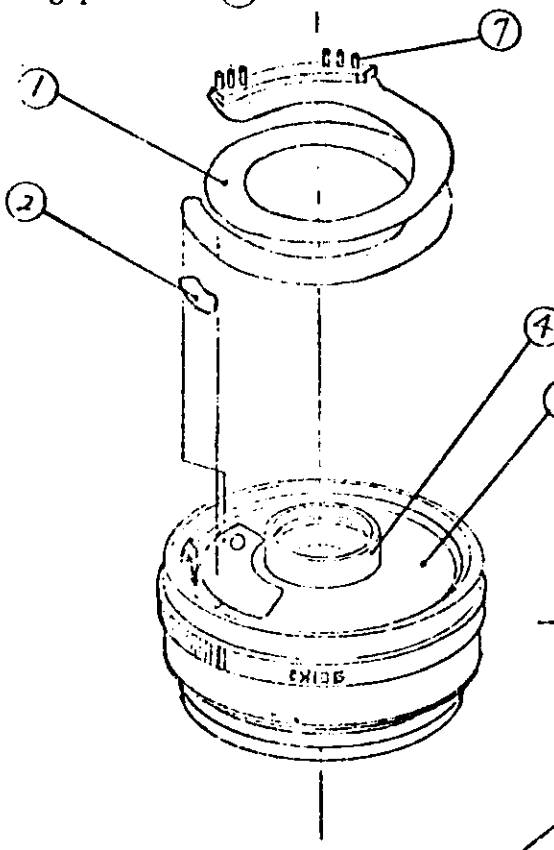


Fig. 1

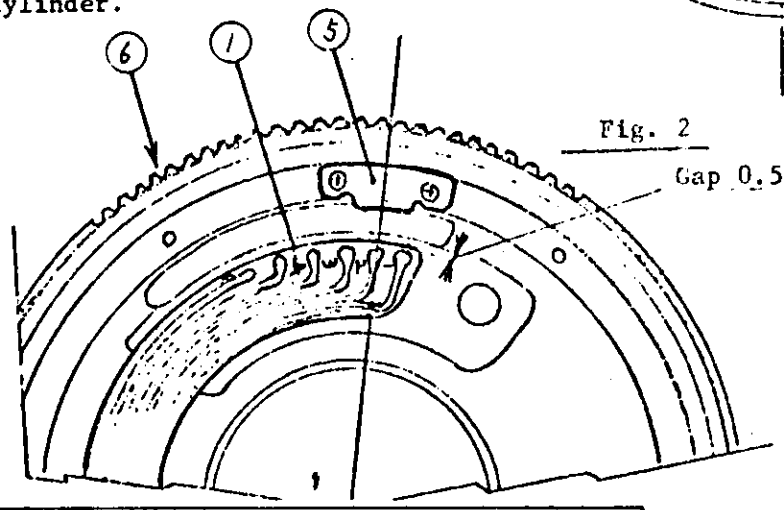


Fig. 2

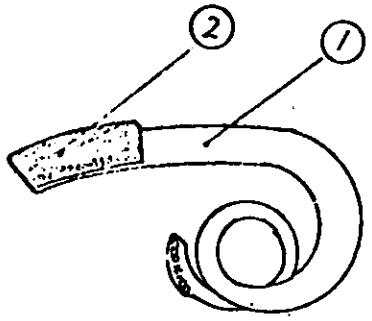


Fig. 3

7	1-210121	Shutter contact
6	1-710300	Helicoid unit
5	1-210142	Straight plate
4	1-210152	Shutter installing ring
3	1-210015	Helicoid inner cylinder
2	1-210521	Flexible fixing tape
1	1-710260	Contact piece and insulating plate set

[Step 5]

Place preliminary solder at 6 contact points of the contact piece and insulating plate set (1).

[Step 6]

Solder each cord of shutter to each contact of the contact piece and insulating plate set (2). At this time connect each cord with the contact piece and insulating plate set (1) as shown in Table 1 and care should be exercised not to have cords overlapped.

[Step 7]

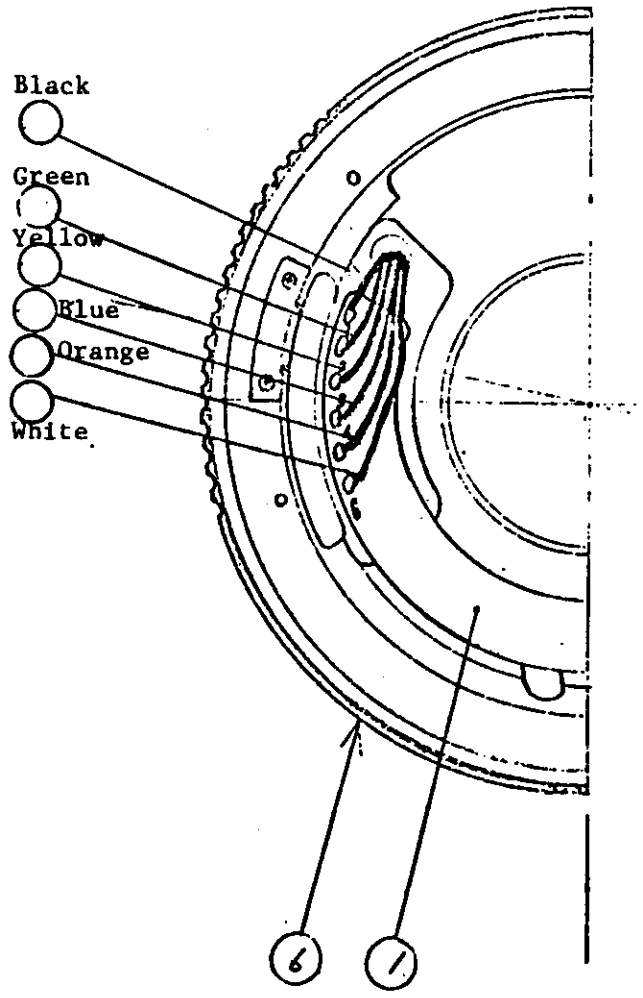
After soldering, clean flux with ether-mixed alcohol, dry it by hot air, apply silicon varnish with a brush and then dry soldered portion naturally.

Information: Silicon varnish (KR 114 manufactured by Shinetsu Kakagu Co.)
Solvent, RIGUROIN (Nippon Sekiyu)

Silicon varnish: solvent = 1 : 10 ∿ 20

Color of shutter cord	Contact No. of contact insulating plate set
Black	1
Green	2
Yellow	3
Blue	4
Orange	5
White	6

Table 1



6	1-710300	Helicoid unit
1	1-710260	Flexible print board A-B

6. 4) Disassembly and reassembly of helicoid

a) Procedure for disassembly

[Step 1]

Remove the screw (16) and then remove the straight plate (15).

[Step 2]

Remove the helicoid inner cylinder. (Right-handed screw)

[Step 3]

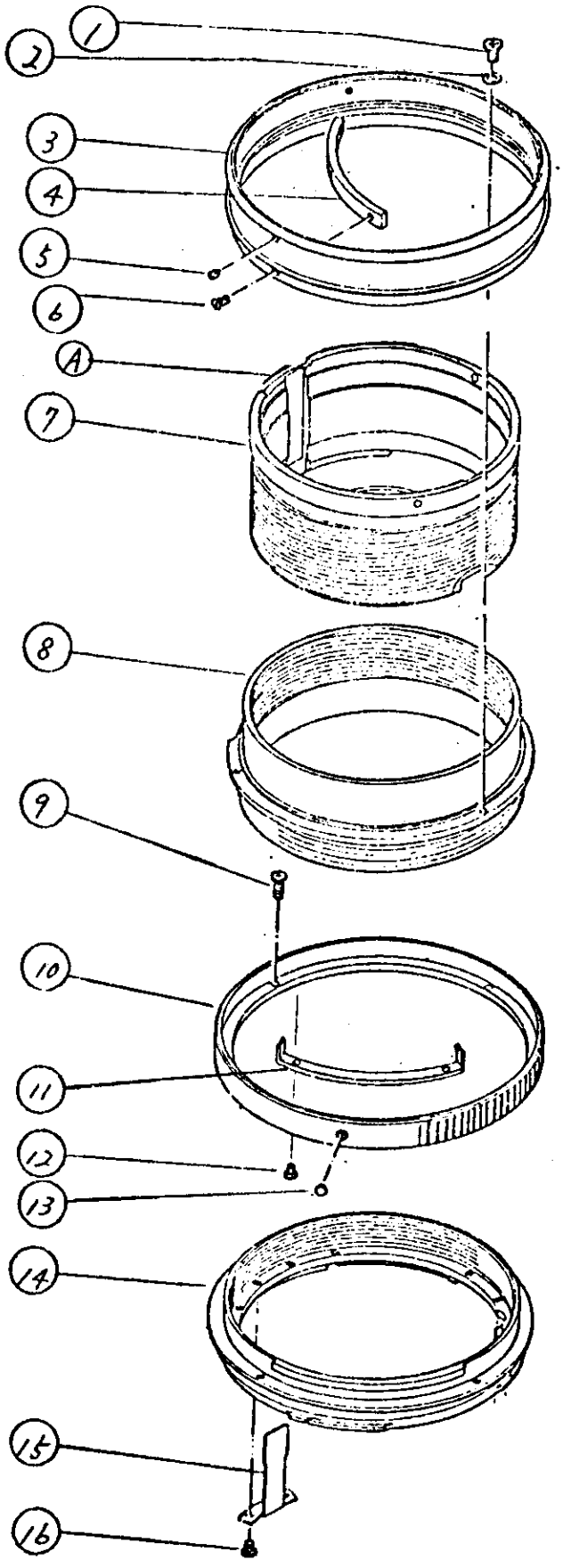
Remove a scale ring fixing screw (1) and then remove the helicoid scale ring.

[Step 4]

Remove the helicoid intermediate cylinder. (Left-handed screw)

Note)

- The grease to be used for helicoid lead screw portion is ROJIMORU #74075
- In applying this grease, do not apply too much. Much grease may be squeezed out.
- Lead screw portion must be protected from dust, etc. Such foreign matters may worsen the movement of helicoid.



16	1-813307	Screw
15	1-210142	Straight plate
14	1-210035	Lens bayonet
13	1-210240	Bayonet ring index
12	1-210720	Stopper calking pin
11	1-210710	Bayonet ring stopper
10	1-210042	Bayonet ring
9	5-811357	Screw
8	1-210022	Helicoid intermediate cylinder
7	1-210015	Helicoid inner cylinder
6	5-831257	Screw
5	5-063026	Set screw
4	1-210261	Helicoid stopper
3	1-210252	Helicoid scale ring
2	5-511421	Washer
1	1-210272	Scale ring installation

6. 4)

b) Procedure for assembly

[Step 1]

Install an index (13) and bayonet ring stopper on the bayonet ring.

[Step 2]

Install the bayonet ring (10) on the lens bayonet (14).

[Step 3]

Screw in the helicoid intermediate cylinder (8) into the lens bayonet (14) until it comes to a stop and then rotate it by an angle of 90° to the right.

[Step 4]

Set the helicoid scale ring (3) with helicoid stopper (4) installed on the helicoid for which steps up to 3 have been done, and rotate the helicoid stopper (4) and bayonet ring stopper (11) until they stop and fix them with the scale ring set screw (1).

[Step 5]

Rotate the helicoid scale ring (3) to the left until it stops, and at the position, screw in the helicoid inner cylinder (7) into the helicoid intermediate cylinder (8). (Right-handed screw)

Note) Adjust the inscribed character of 58ϕ on the bayonet to (A) of the helicoid inner cylinder (7), and then screw it from the position.

[Step 6]

Rotate the helicoid inner cylinder (7) slightly back from its completely screwed in position and then install the straight plate (15).

Note) At the time, the overall length of the helicoid which is completely receded must be 38.4mm ± 0.4.

If this dimension is not obtained, change the screwed in position of the helicoid inner cylinder (7) described in Step 5 pitch by pitch until the above dimension is obtained.

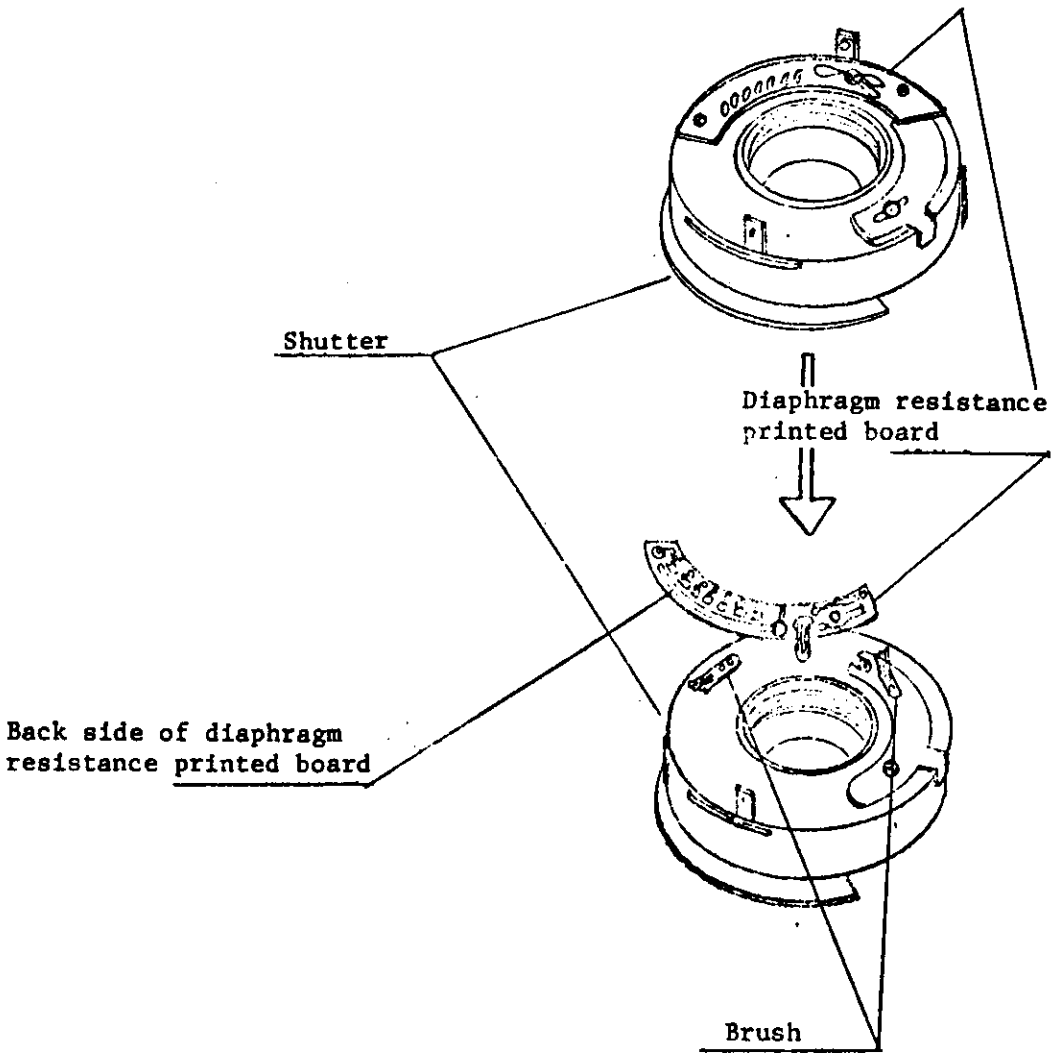
[Step 7]

Check the helicoid to see if it can be moved out or moved in smoothly and make adjustment if it is not smooth.

(Information)

Helicoid inner cylinder		M 66.4	P = 1.25	L = 20	
Helicoid intermediate cylinder	Inner	M 66.4	P = 1.25	L = 20	
	Outer	M 70	P = 1.0	L = 4	Left-handed screw
Lens bayonet		M 70	P = 1.0	L = 4	Left-handed screw

5. OTHERS


Shutter
Diaphragm resistance printed board
Back side of diaphragm resistance printed board
Brush

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Installation of shutter to helicoid unit

[Step 1]

Set a shutter unit (1) on the helicoid inner cylinder assembly jig (7).

[Step 2]

Accoading to the color display of flange focal distance of lens, place a washer for adjustment with its share drop faced downward (2) on the shutter unit (1). (Refer to Table 1)

[Step 3]

Place a helicoid unit (3) on it. As shown in Fig. 1, thread cords of shutter (1) through a vinyl tube and place it through the hole for shutter cords (3).

[Step 4]

Set (A) of the helicoid unit (3) to the helicoid inner cylinder assembly jig (7) as shown in Fig. 2.

[Color chart for flange focal length]

Color	Washer for adjustment
Orange	0.8
Blue	
Yellow	0.7
Green	0.5
Purple	0.3
Red	0.1

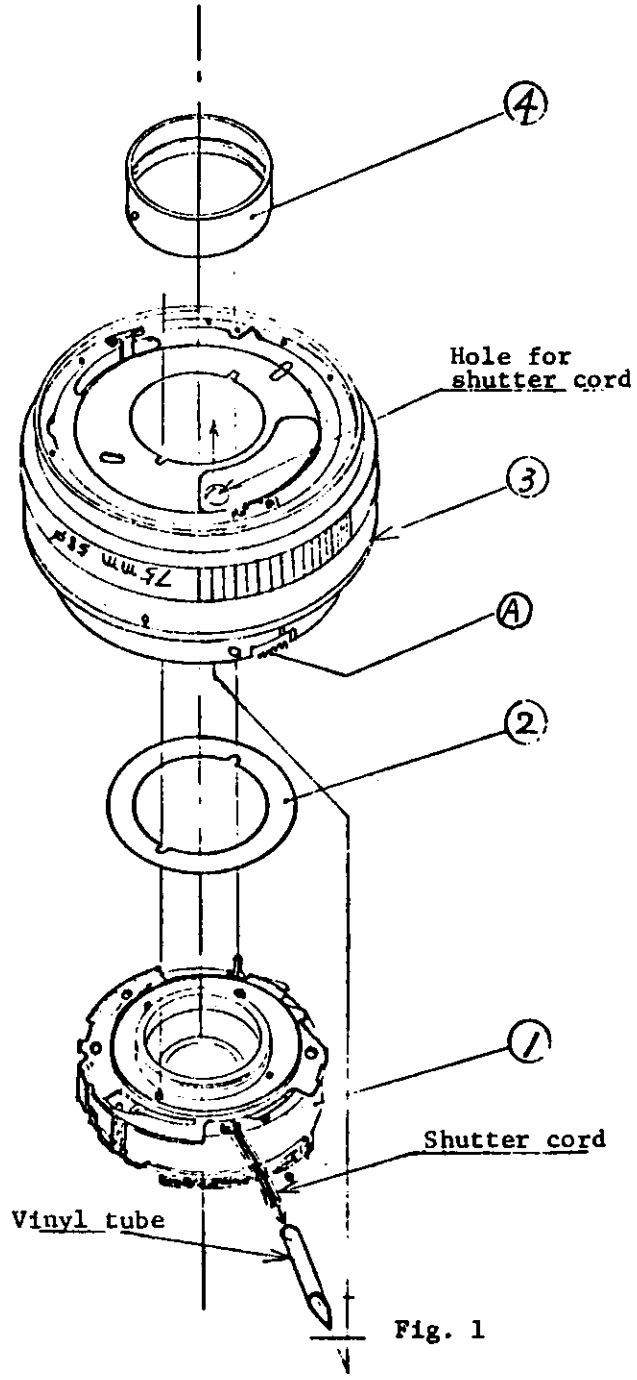


Fig. 1

2	1210610	Washer for adjustment 0.4		7	1-210013AJ Helicoid inner cylinder assembly jig
2	1210600	" 0.3		6	Spanner pin for installing shutter
2	1210590	" 0.2		5	Spanner for ring for installing shutter
2	1210171	" 0.1		4	Shutter installing ring
1	1710210	Shutter unit		3	Helicoid unit

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Installation of shutter to helicoid unit

[Step 5]

To fix the helicoid unit (3) set on the helicoid inner cylinder assembly jig (7) and a shutter unit (1), tighten the shutter installing ring (4) with a spanner for shutter installing ring (4) as shown in Fig.(2). Tighten it securely. Do not damage the shutter installing ring (4). Make adjustment by means of an adjusting nut (5) so as not to have a spanner pin for shutter installing ring come off through the guide hole of shutter installing ring (4).

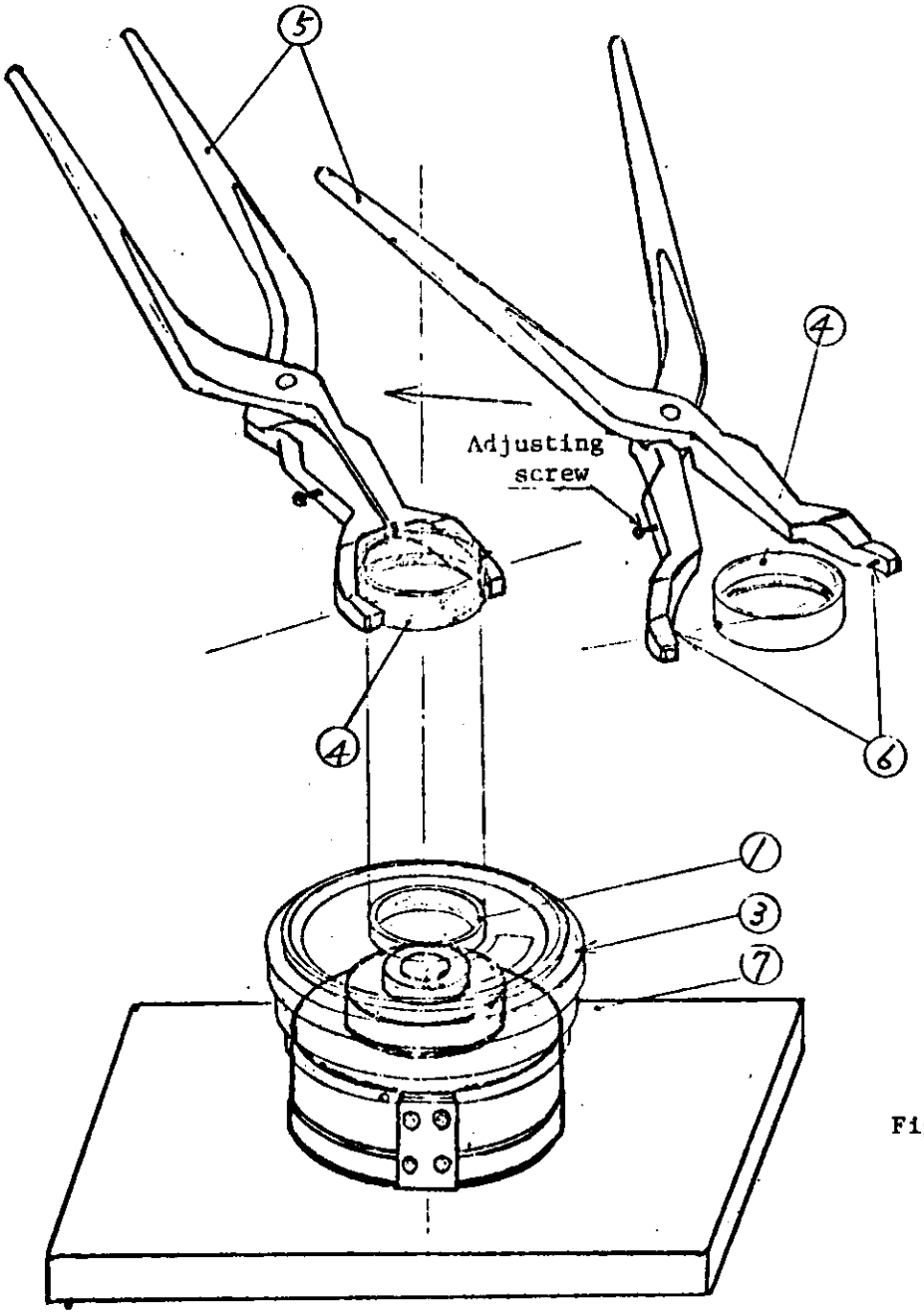


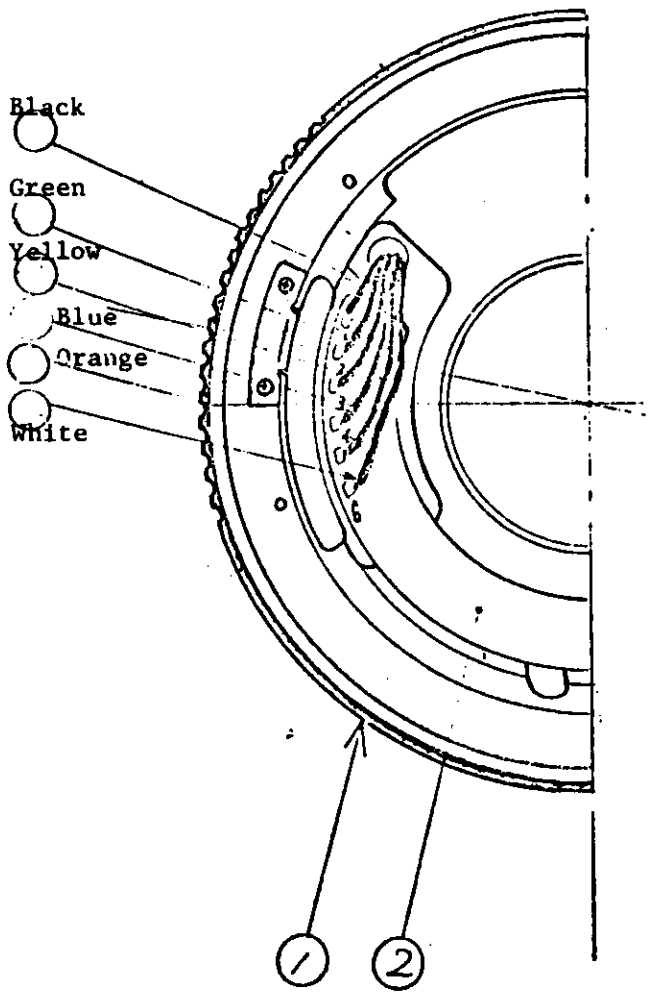
Fig. 2

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Soldering of shutter and contact piece and insulating plate set

Color of shutter cord	Contact No. of plate
Black	1
Green	2
Yellow	3
Blue	4
Orange	5
White	6



[Step 1]

Place preliminary solder on each of 6 contacts of the contact piece and insulating plate set (2).

[Step 2]

Solder each cord of the shutter to each contact of the plate (2). Arrange cords to respective contacts as shown in the drawing and care should be exercised not to overlap cords.

[Step 3]

After soldering, wash flux with ether-mixed alcohol and dry it by hot air, apply silicon varnish with a brush all over the soldered portion and dry it naturally.

Information) Silicon varnish (KR 114 manufactured by Shinetsu Kagaku Co.)
Solvent RIGUROIN (Nippon Sekiyu)

Silicon varnish: solvent = 1 : 10 ∿ 20

2	1710260	Contact piece and insulating plate set	
1	1710300	Helicoid unit	

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Assembly of set ring unit

[Step 1]

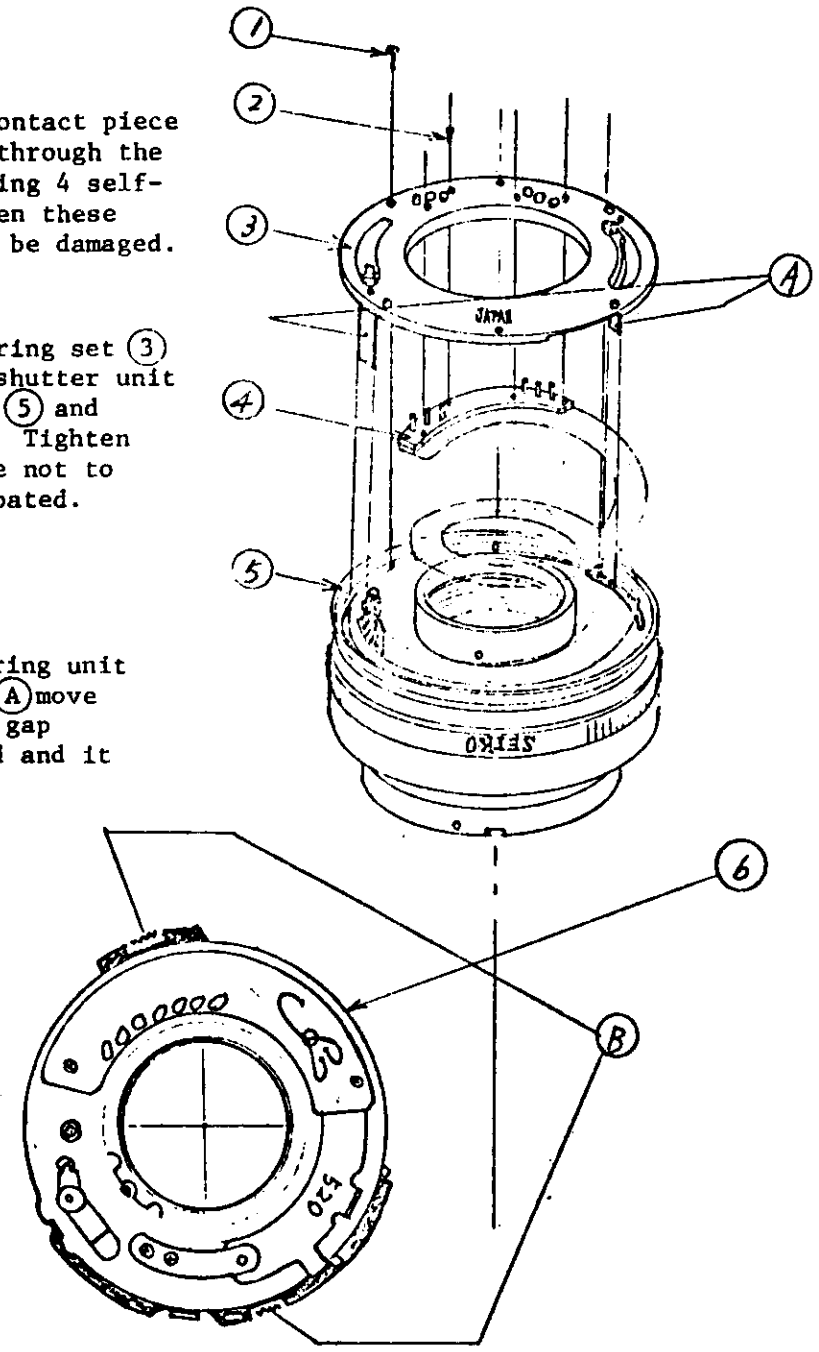
Tighten 6 terminals of the contact piece and insulating plate set (4) through the set ring base plate (3) by using 4 self-tap screws (2). Do not tighten these screws too tight as they may be damaged.

[Step 2]

Thread the leg A of the set ring set (3) through the groove B of the shutter unit (6) installed on the helicoid (5) and tighten it with 6 screws (1). Tighten screws with a constant torque not to have the set ring unit (3) floated.

(Note)

Prior to installing the set ring unit (3), check to see if its legs (A) move smoothly, there is a uniform gap between the unit and helicoid and it is not bent.



6	1710210	Shutter unit	
5	1710200	Helicoid with shutter installed	
4	1710260	Contact piece and insulating plate set	
3	1710220	Set ring unit	
2	5893307	Screw (selftap)	
1	5833407	Screw	

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Installation of light-tight ring

[Step 1]

Install the light-tight ring (1) on the helicoid with shutter installed. (3) As shown in Fig. 2, have the rise portion of the light-tight ring slide into the guide groove of the helicoid's straight plate and set the ring so as to have its side B hit side A of the helicoid and those contacted surface should be adhered to each other with adhesive (bond). Their direction must be as shown in Fig. 1, and a rear cap (4) should be applied to protect the contact piece and insulating plate set others.

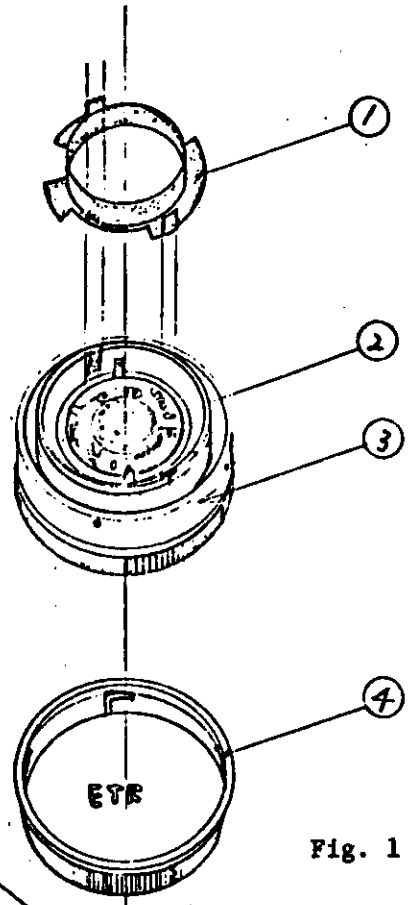


Fig. 1

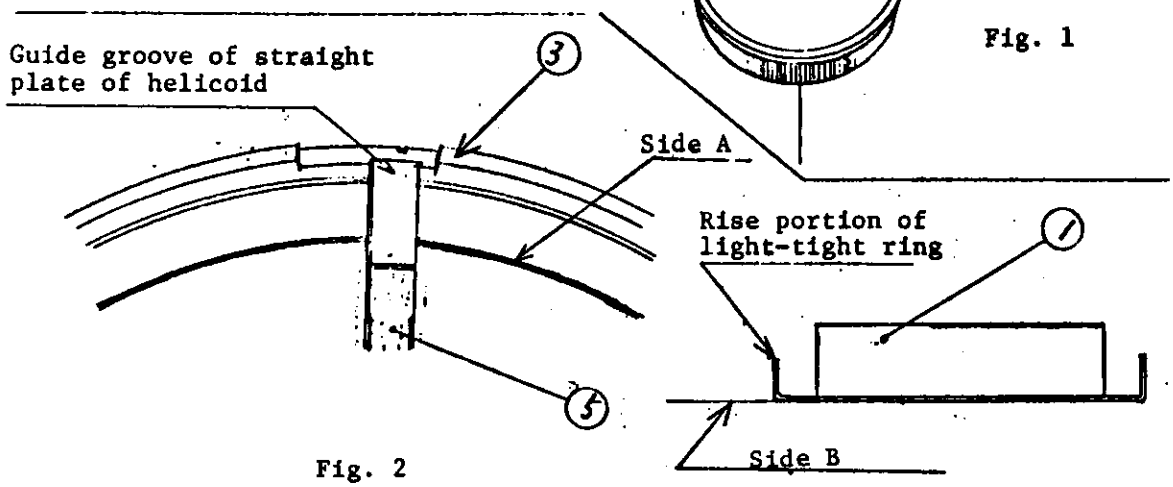


Fig. 2

5	1210142	Straight plate
4	1242602	Rear cap
3	1710200	Helicoid with shutter installed
2	1710210	Shutter unit
1	1210531	Light-tight ring

ORDER NO.

PROCESS: Assembly of helicoid installed with front rear frame

JOB : Installation of front frame unit and depth of field scale ring

[Step 1]

Apply a rear cap (6) to the helicoid with shutter installed for the purpose of protection.

[Step 2]

Set the manual lever set (13) at the side hole of a depth of field scale ring (2).

[Step 3]

Install the above unit on the helicoid with shutter installed (5). At this time, place the manual lever axis of the lever set (13) in the groove of the helicoid (5).

[Step 4]

Apply grease to the protion of manual arm C (15) of front frame unit (1) where it contact with the manual lever set (13). Fig.A.

[Step 5]

Lastly set the front frame unit (1) to the helicoid which has been assembled up to the stage of Step 3. At this time, adjust T change-over ring (8) to shutter AT change-over lever (11), diaphragm arm (9) to shutter diaphragm ring 10 and manual arm(B)(7) to shutter diaphragm lever (12) respectively. Tighten the unit with 3 screws (14) by applying locktite.

Note: Do not tighten them too tight.

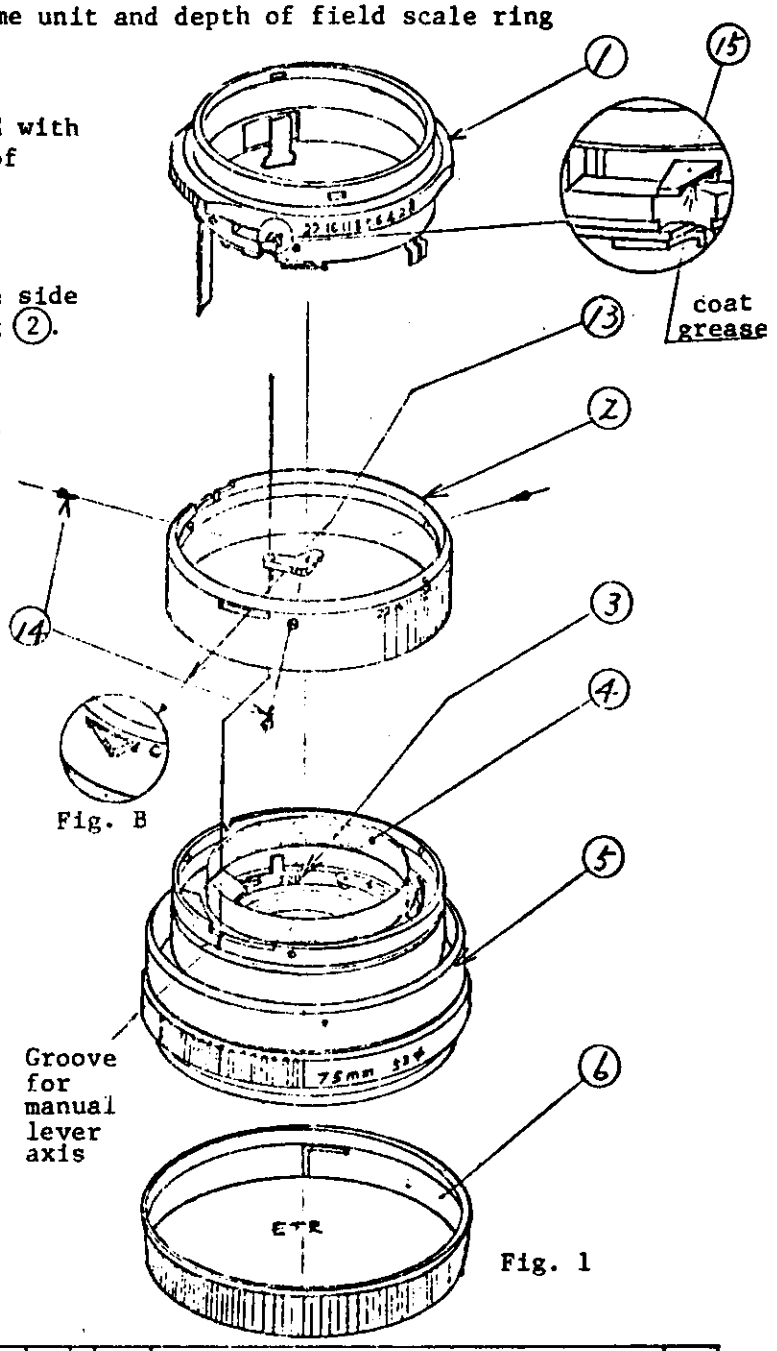


Fig. B

Fig. 1

8	1210351	T change-over ring	1				
7	1210392	Manual arm B	1		15	1210403 Manual arm C	1
6	1242602	Rear cap	1		14	5853559 Screw	3
5	1710200	Helicoid with shutter installed	1		13	1710170 Manual lever set	1
4	1210531	Light-right ring	1		12	Shutter diaphragm lever	1
3	1710210	Shutter unit	1		11	Shutter AT change-over lever	1
2	1210295	Depth of field scale ring	1		10	Shutter diaphragm ring	1
1	1710110	Front frame unit	1		9	1210342 Diaphragm arm	1

ORDER NO.

PROCESS: Assembly of helicoid installed with front-rear frame

JOB : Installation of front frame unit and depth of field scale ring

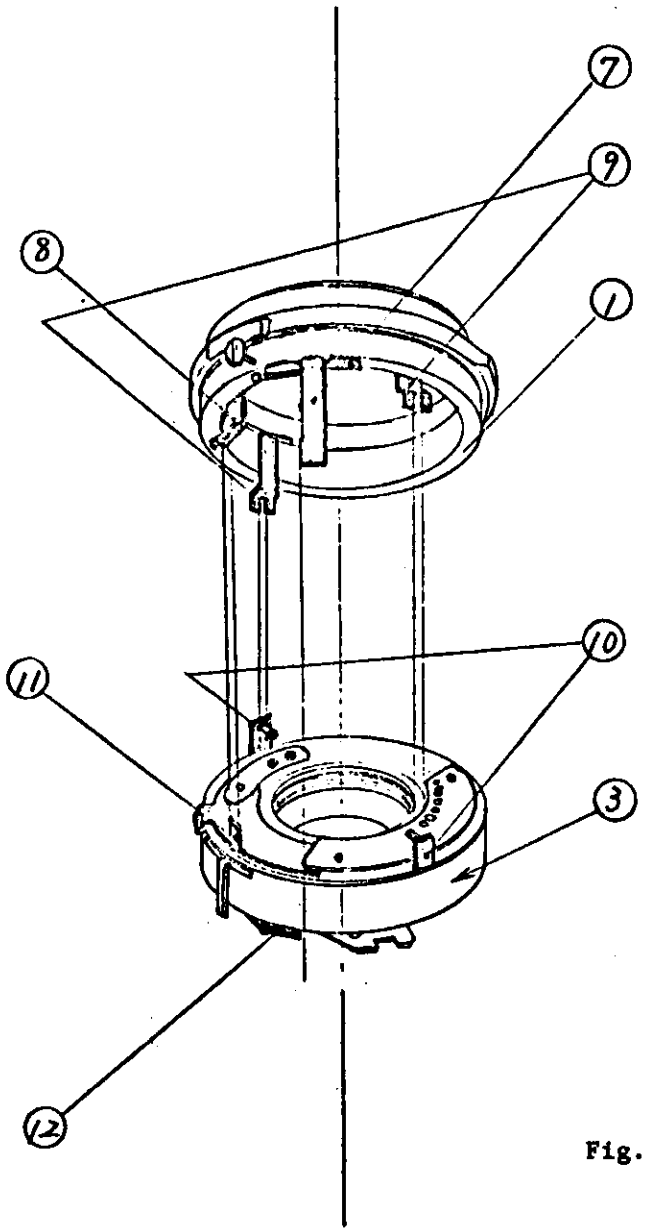


Fig. 2

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Diaphragm resistance value M switch timing check

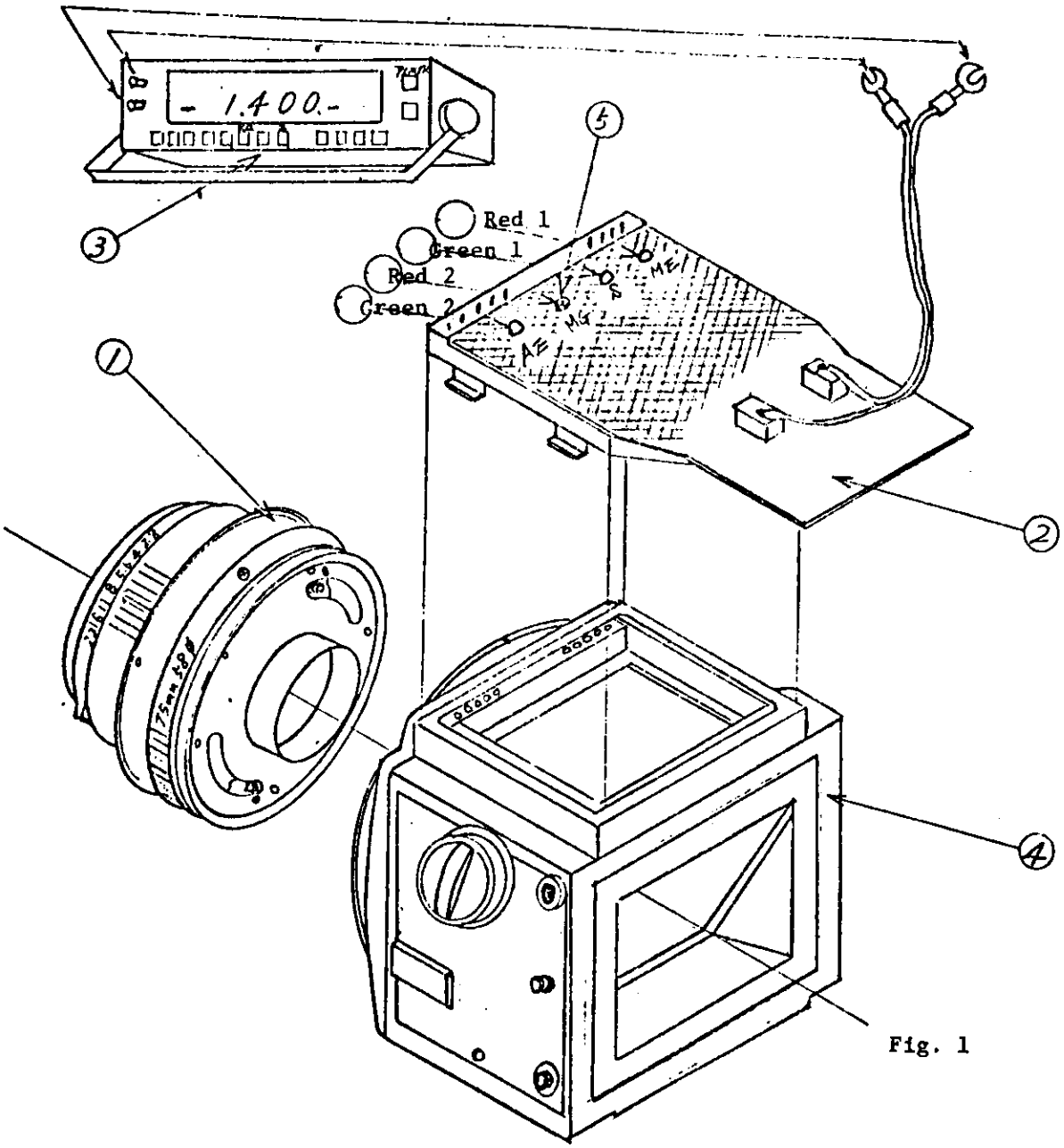


Fig. 1

5	MG display lamp
4	ETR standard body
3	Digital multitester (sanwa)
2	(1754500-CT)M switch timing gauge
1	Helicoid installed with front and rear frame 1710100

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Diaphragm resistance value M switch timing check

[Step 1]

Set an M switch timing gauge (2) on the standard body (4).

[Step 2]

Set the helicoid with front and rear frame installed (1) on the standard body (4), and confirm that it performs functions as listed in Table 1 by releasing the shutter at slow speed (1 to 1/2 second) several times.

Note: o A unit of helicoid which is completely recorded and causes display lamps to light is judged to be defective. Such a helicoid installed with lens mechanically focus adjusted is judged to be perfect if it does not cause display lamps to light under completely receded condition.

o A unit which causes MG display lamp (5) to light when it is wound will be judged as defective.

Table 1

Condition of body and lens	Gauge display
Winding complete	Red 1 (ME) light ON
By about 1/2 stroke until shutter is released.	Red 1 (ME) light ON, Green 1 (S) is light OFF
S is pushed. Shutter open.	ME light OFF, S, MG light ON
S button is released (return)	ME, S light OFF, MG light ON
Shutter closes	ME, S, MG light OFF

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Diaphragm resistance value M switch timing check

[Step 1]

As shown in Fig. 1, connect the M switch timing gauge (2) to a digital multi-tester (3) and set the range of the tester at 2KΩ.

[Step 2]

Rotate the aperture ring (7) and read out each resistance value at click position.
The range of diaphragm resistance values is as shown in Table 2.

[Step 3]

Confirm that relationship between the position of inscribed marks of the aperture ring (7) and that of depth of field scale ring (6) is on the datum line shown in Fig. 2.
If they are deviated in position, adjust them to the datum line by bending 2 aperture arms (9) by the same amount.

[Refer to Standard work instruction sheet No. 13]

[Step 4]

Check the aperture ring (7) if it rotate smoothly.

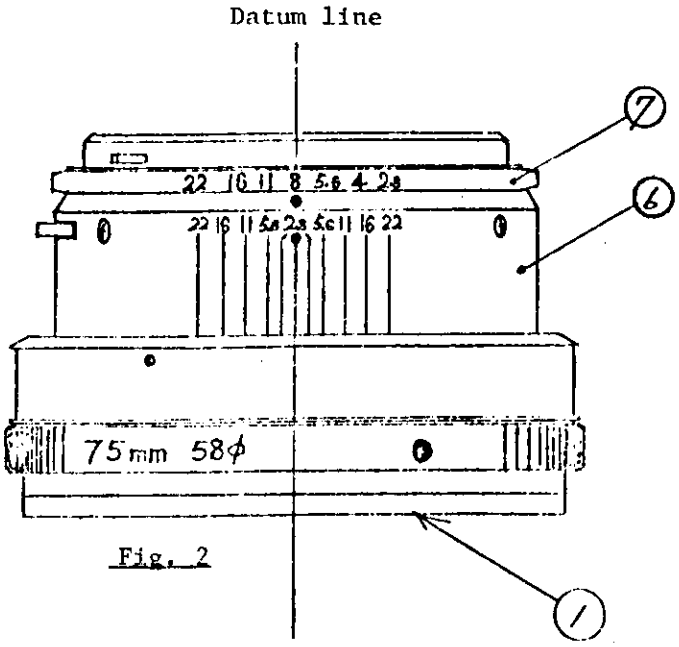


Fig. 2

Table 2

Diaphragm	Diaphragm resistance value
F 2.8	1330 ∿ 1470 Ω
4	1140 ∿ 1260
5.6	950 ∿ 1050
8	760 ∿ 840
11	570 ∿ 630
16	380 ∿ 420
22	190 ∿ 210

7	1210335	Aperture ring	1
6	1210295	Depth of field scale ring	1
1	1710100	Helicoid with front and rear frame installed	1

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Shutter inspection

[Step 1]

Set the helicoid with front and rear frame installed on the standard body and check the operation of shutter by releasing it five times each at a speed of 1/8 to 1/30 with an aperture of F22 with the helicoid extended and receded respectively.

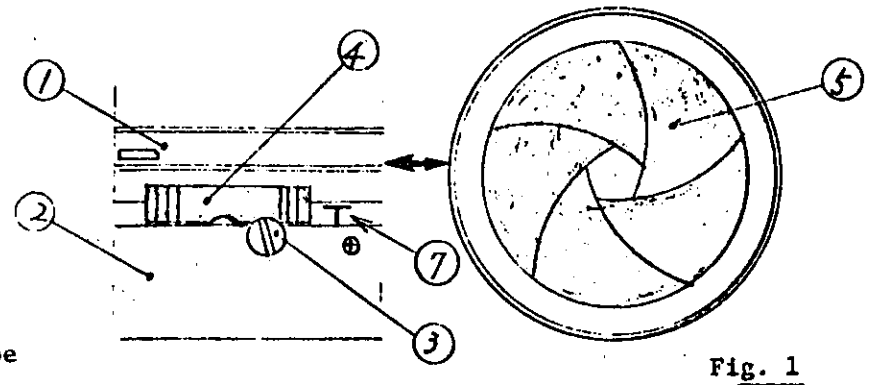


Fig. 1

o Item of inspection
1. Shutter vane (6) and diaphragm iris (5) must be smooth in movement.
2. The aperture of iris diaphragm (5) must be the same as standard aperture. Aperture must be accurate without variation.

[Step 2]

Set the T change-over lever of the helicoid with front and rear frame installed at the position shown in Fig. 1, and cause the shutter to operate, and after that put the lever back to the position shown in Fig. 2.

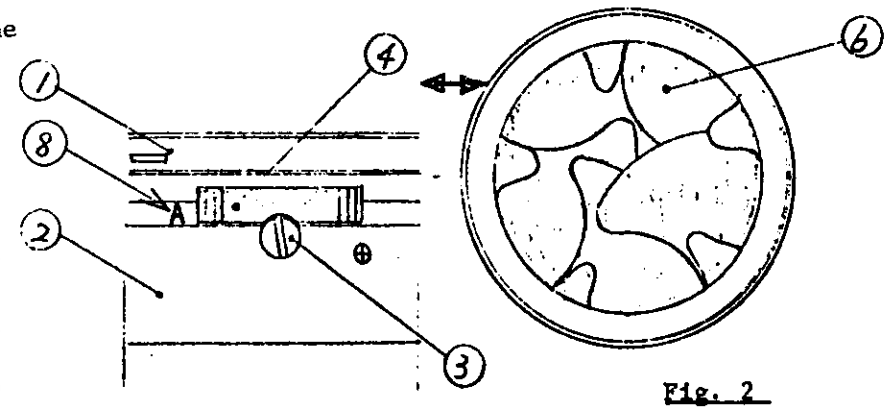


Fig. 2

At this time, T lever lock (3) must be kept loosened not to press the T change-over lever (4)

o Item of inspection
(1) When the shutter is pushed with T change-over lever (4) set at the position of Fig. 1, the shutter vane (6) must be held raised with diaphragm iris kept in the condition of Fig. 1. That is, the condition of Fig. 1.
(2) When the T change-over lever (4) is set at the position of Fig. 2, the shutter vane (6) of Fig. (2) must be lowered. That is, the condition of Fig. 2.
(3) T change-over lever (4) must be smooth in operation, and click movement must be made.
(4) Change-over of inspection items from 1 to 2 must be smooth and the operation of shutter vane (6) must be swift and stable at the time.

[Step 3]

After satisfying the above items of inspection, T lever lock (3) is tightened ant T change-over lever (8) is fixed.

4	1210362 T change-over lever		8	Inscribed character A on depth of field scale ring
3	1210621 T lever lock		7	" T "
2	1210295 Depth of field scale ring		6	Shutter vane
1	1210324 Front frame		5	Shutter diaphragm iris

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Inspection of synch, conductivity and insulation

[Step 1]

Set the helicoid with front and rear frame installed on the standard body.

[Step 2]

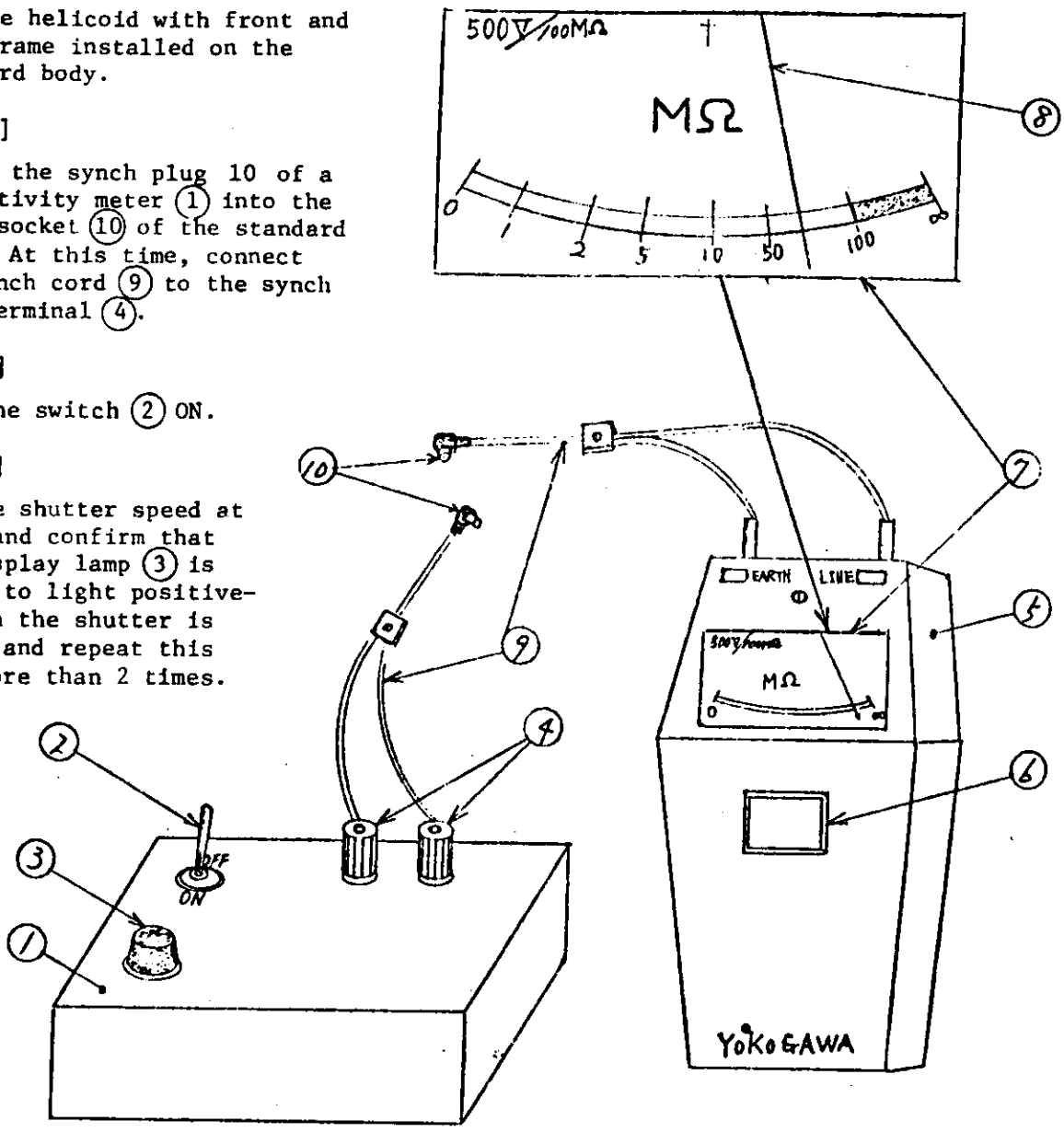
Insert the synch plug 10 of a conductivity meter (1) into the synch socket (10) of the standard body. At this time, connect the synch cord (9) to the synch cord terminal (4).

[Step 3]

Turn the switch (2) ON.

[Step 4]

Set the shutter speed at 1/500 and confirm that the display lamp (3) is caused to light positively when the shutter is pushed and repeat this test more than 2 times.



5	Insulation meter 500V/200MΩ	10	Synch plug
4	Synch cord terminal	9	Synch cord
3	Display lamp	8	Indicator needle
2	Synch conductivity meter switch	7	Insulation meter
1	Synch conductivity meter	6	Switch

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Inspection of synch, conductivity and insulation

[Step 5]

Disconnect the synch plug (10) of the conductivity meter (1) from the synch socket of the standard body, and set the synch plug (10) of the insulation meter (5) into the synch socket of the standard body.

[Step 6]

Open the switch (6) of the insulation meter (5).

[Step 7]

Set the shutter speed at 1 sec., and confirm that the indicated values of the needle (8) within the insulation meter (7) must be as follows:

Before shutter is pushed	Insulation resistance more than	50MΩ (50MΩ~∞)
While shutter in operation	"	0MΩ
After shutter operated		50MΩ (50MΩ~∞)

[Step 8]

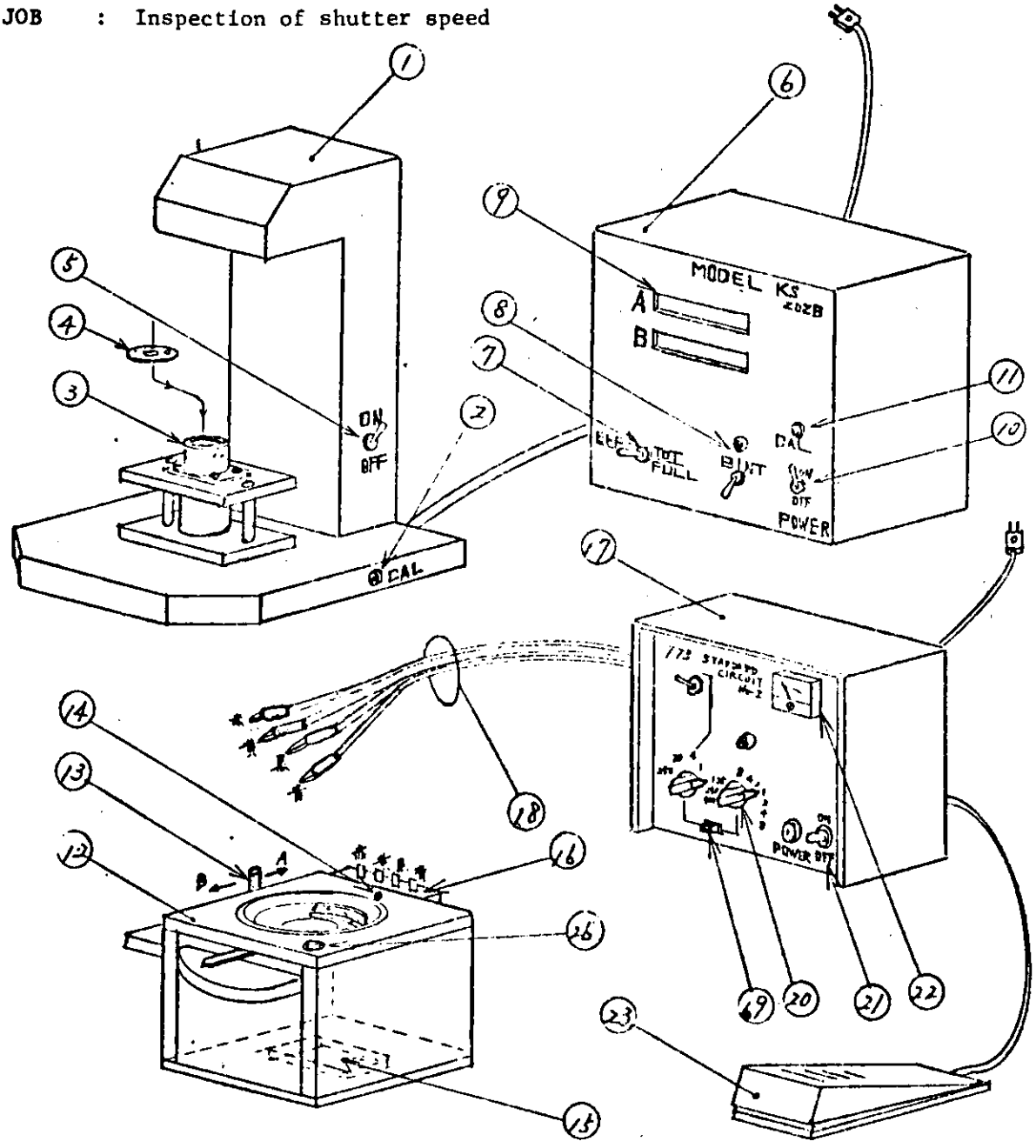
Confirm that the needle (8) of the insulation meter (5) is between 50MΩ and ∞ when the helicoid with front and rear frame installed is moved forward or backward.

Note: o Use a conductivity meter manufactured by Bronica.
o Use an insulation meter of 500V, 100M (200MΩ) manufactured by Yokogawa.

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Inspection of shutter speed



9	Measured value display window	18	Connection cord
8	Switch	17	Standard pulse generator for shutter speed
7	Switch	16	Lens shutter inspection jig terminal
6	Shutter tester Model KS202B	15	Guide hole
5	Guide hole	14	Mark
4	Minimum aperture ring	13	Operating lever
3	CT-354 Lens shutter speed inspection jig B	12	CT-354 Lens shutter inspection jig A
2	Calibrate adjusting screw	11	Calibrate display lamp
1	Shutter tester Model KS202B	10	Switch

ORDER NO.

PROCESS: Inspection of helicoid installed with front rear frame

JOB : Inspection of shutter speed

[Step 1]

Turn the power switch (5) and (10) of the shutter tester Model KS202B (1), (6) ON.

[Step 2]

Install a lens shutter speed inspection tool (3) on the shutter tester (1), and set a minimum opening aperture ring (4) in the tool.

[Step 3]

Place a lens shutter speed inspection tool (12) over the lens shutter speed inspection tool (3) and at this time use the guide hole (15).

[Step 4]

Connect group of connecting cords (18) of a shutter speed standard pulse generator (17) to terminals (16) of the lens shutter speed inspection tool (12) in such a manner blue to blue, black to black, yellow to yellow and red to red.

[Step 5]

Set the switch (7) to the left, switch (8) to downward, switch (19) to the right, and switch (21) on.

[Step 6]

Move the operating lever (13) of the lens shutter speed inspection tool (12) in the direction of A to its extreme end, set the helicoid with front and rear frame installed, with its index mark adjusted to the mark (14) of the lens shutter speed inspection tool (12).

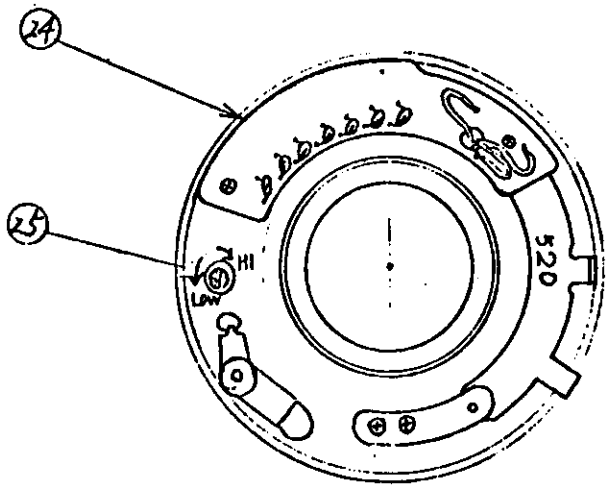


Fig. 2

Table 1

Shutter speed	Range (m sec.)
1/500	2.67 ∿ 1.43
1/250	5.34 ∿ 2.86
1/125	10.7 ∿ 5.72
1 sec.	1366 ∿ 732

23	Foot switch					
22	Voltage display meter	1				
21	Switch	1		26	Lens release	
20	Speed indicating dial	1		25	Speed adjusting screw	1
19	Switch	1		24	Shutter unit	1

[Step 7]

Set the diaphragm of the helicoid with front and rear frame installed at the full opening (In the case of 75mm standard lens, F 2.8).

[Step 8]

Move the operating lever (13) to the position of A, and cause the calibrate display lamp (11) to light by rotating the calibrate adjusting screw (2).

[Step 9]

In the subsequent operations, cause the shutter to operate by shifting the operating lever (13) in the direction of A or B.

[Step 10]

The measurement of shutter speed is performed at 4 types of speed, 1/500, 1/250, 1/125 and 1 sec. At this time, set the speed indicating dial (20) to each of those speeds and the shutter must be operated more than 3 times at each speed, and confirm that measured values are within the range shown in Table 1. At this time, the voltage display meter (22) should indicate 6V. Measured values are digitally indicated in the display window (9).

[Step 11]

The voltage display meter (22) indicates 4V when the foot switch (23) is pressed. Confirming it indicates 4V, make measurement in the same manner as Step 10 and confirm shutter speeds.

[Step 12]

In case a high speed shutter is deviated from the range, it can be somewhat adjusted by rotating the speed adjusting screw (25). In this case, speed becomes faster when rotated to the right, and becomes slower when turned to the left.

Note: The screw should be lightly rotated to the left or right without applying undue force.

ORDER NO.

PROCESS: Assembly of lens (1)

JOB : Mounting of front lens group, rear group and name ring

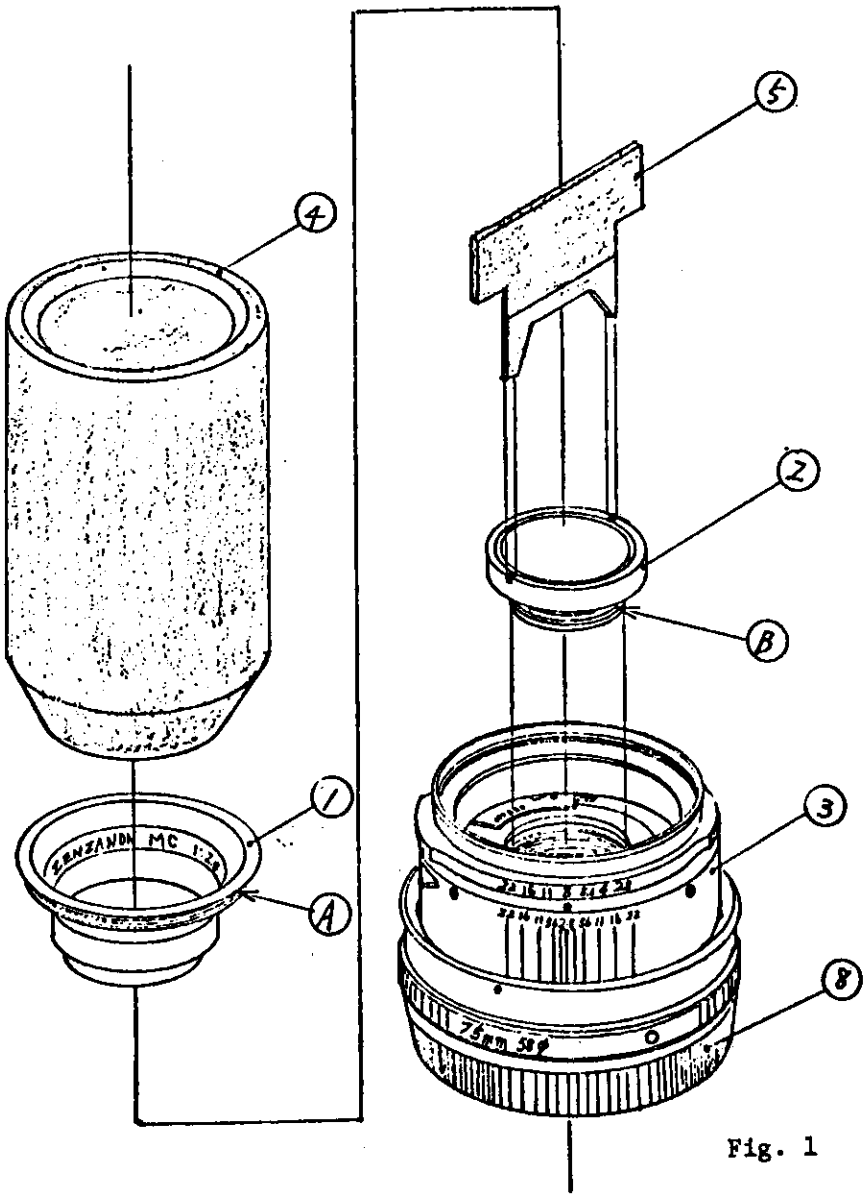


Fig. 1

5	1-210180AJ Lens front group pin face	1			
4	1-210482AJ Name ring installing jig	1			
3	1710100 Helicoid with front and rear frame installed		8	1242602 Rear cap	
2	1210180 Lens front group		7	1-210180AJ Lens rear group pin face	1
1	1210482 Name ring		6	1210180 Lens rear group	

ORDER NO.

PROCESS: Assembly of lens

JOB : Mounting of front lens group, rear group and name ring

[Step 1]

Check the front lens group (2) and rear group (6) for any scratch, air bubble, dirt, stain, etc. and clean them with ether-mixed alcohol.

[Step 2]

Apply grease at the threaded portion (B) of the front lens group (2) and screw it securely into the helicoid with front and rear frame installed (3) by using a pin face wrench (5).

Note: At this time, be sure to install a rear cap (8) on the lens.

[Step 3]

Apply grease to the threaded portion (A) of the name ring (1) and then screw the ring securely into the helicoid with front and rear frame installed (3) by using a jig for mounting name ring (4). Fig. 1

[Step 4]

Apply grease to the threaded portion (C) of the rear lens group (6) and then screw it into the helicoid with front and rear frame installed (3) by using a pin-face wrench (7). Fig. 2

Note: o In screwing the rear lens group, (6) care should be exercised not to damage the threaded portion of both lens side and shutter side since they are made of aluminum.

o The lens must be securely screwed into the position with designated grease coated on its threaded portion.

As grease for the lens, ROJIMORU #4019 should be used.

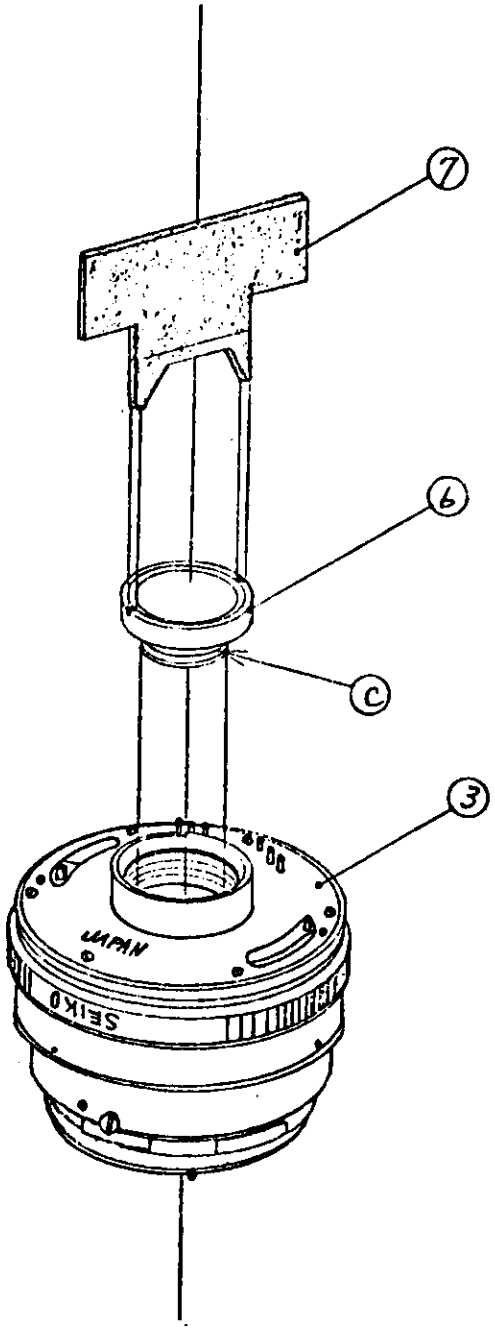


Fig. 2

ORDER NO.

PROCESS: Mechanical focus adjustment of assembly of lens (1)

JOB : Mechanical focus adjustment

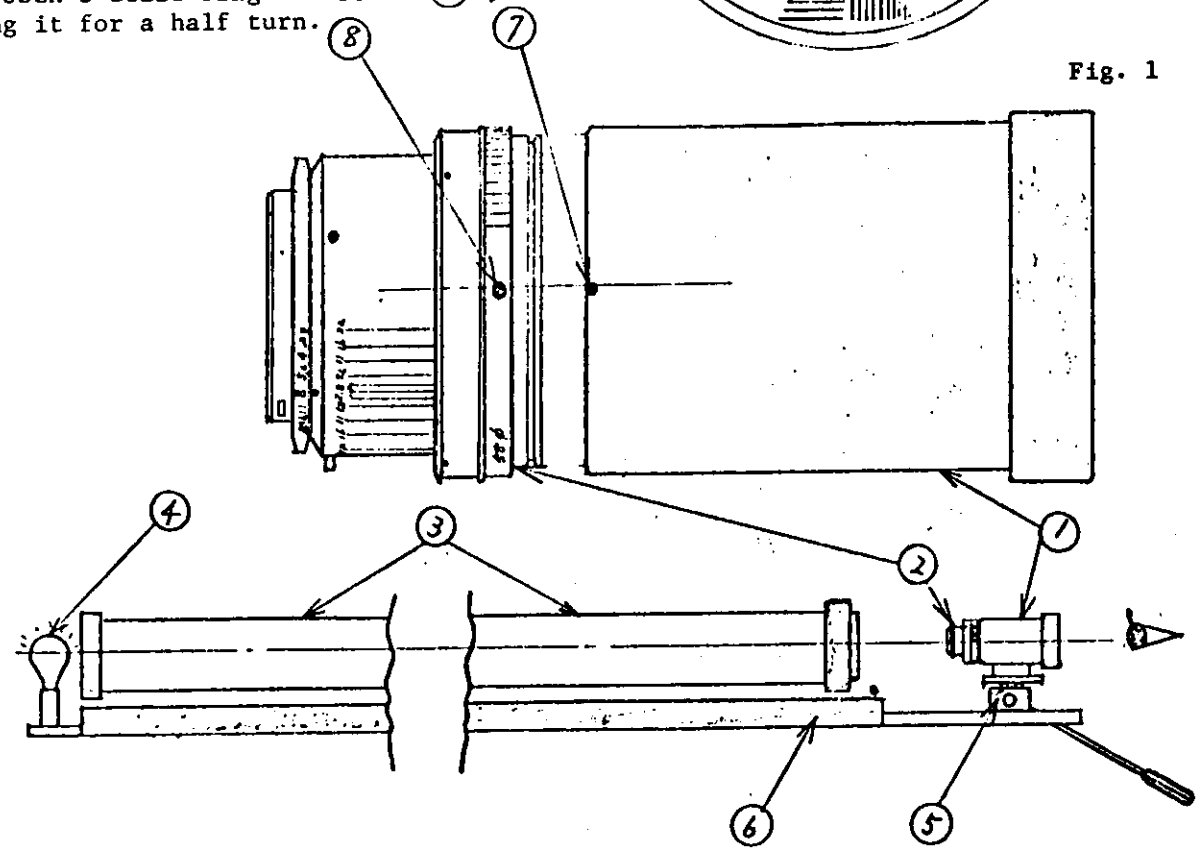
[Step 1]

Install the helicoid with lens assembled (2) on the mount for measuring FB (1). In this case, first adjust the index mark (8) of the helicoid (2) to the mark (7) of the mount (1), and then set the helicoid by turning it counterclockwise.

[Step 2]

Loosen 3 scale ring set screws (9) by turning it for a half turn.

Fig. 1



9	1210272	Scale ring set screw			
8	1210240	Bayonet ring index	17	1210022	Helicoid intermediate cylinder
7		Mark	16	1710141	T change-over ring
6		Collimator mount	15	1210335	Aperture ring
5		Tripod pan head	14	1210531	Light-tight ring
4		Light source	13	1710210	Shutter unit
3		Collimator	12	1210295	Depth of field scale ring
2	1710010	Helicoid with lens	11	1710170	Manual lever set
1	CT351	Mount for measuring FB	10	1210252	Helicoid scale ring

ORDER NO.

PROCESS: Mechanical focus adjustment of assembly of lens (2)

JOB : Mechanical focus adjsutment

[Step 3]

Turn the switch of light source (4) on and then adjust the pan head (5) so as to have the center of mount for measuring FB (1) come to the light axis of the collimator (3) and fix it.

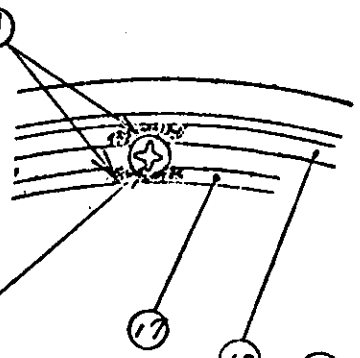


Fig. 3

[Step 4]

Apply lightly a loupe (22x) against the ground glass of the mount for measuring FB, and adjust the helicoid scale ring (10) to a position where No.4 can be seen most clearly by rotating it together with the intermediate cylinder of the helicoid while lightly holding it.

[Step 5]

After adjusting it to No.4 rotate the helicoid scale ring (10) alone counterclockwise until it comes to a stop, and then tighten and fix scale ring mounting screws (9), and then confirm again that it is adjusted to No.4. After that, lightly apply screwlock (threebond) over the portion of A in Fig. 3.

Note: o In fixing the helicoid scale ring, (10) care should be exercised not to warp the ring or not to tighten it too hard.

o Such units which are hard to be mechanically focus adjusted by means of collimator should be treated as poor resolution unit.

Fig. 4

ORDER NO.

PROCESS: Completed 75mm lens (1)

JOB : Mounting of helicoid scale and leatherette

[Step 1]

Rotate the helicoid scale ring (4) counter-clockwise until it comes to a stop, and at that point, install a rear cap (6) over the unit.

[Step 2]

Have the helicoid scale (2) slid into between the depth of field scale ring (7) and helicoid scale ring (4) and adjust them so as to have the center of infinite mark on the helicoid scale (2) and the green line of F2.8 of depth of field scale ring aligned with the datum line as shown in Fig. 2, and fix them lightly at one point by means of a set screw (5). At this time, apply locktite to the set screw. (The screw must be slightly below the surface.)

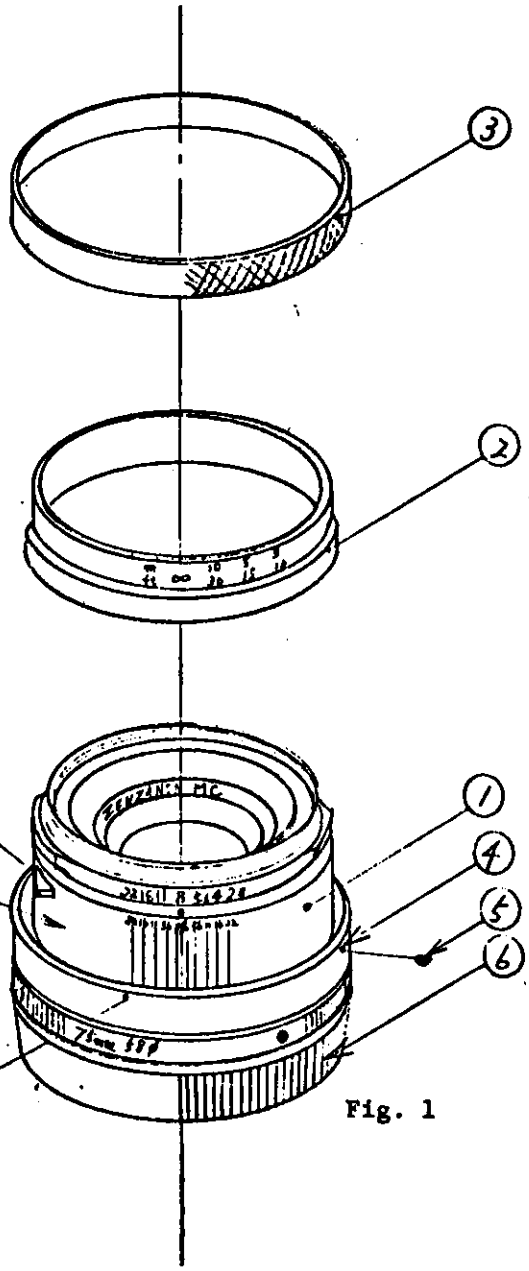


Fig. 1

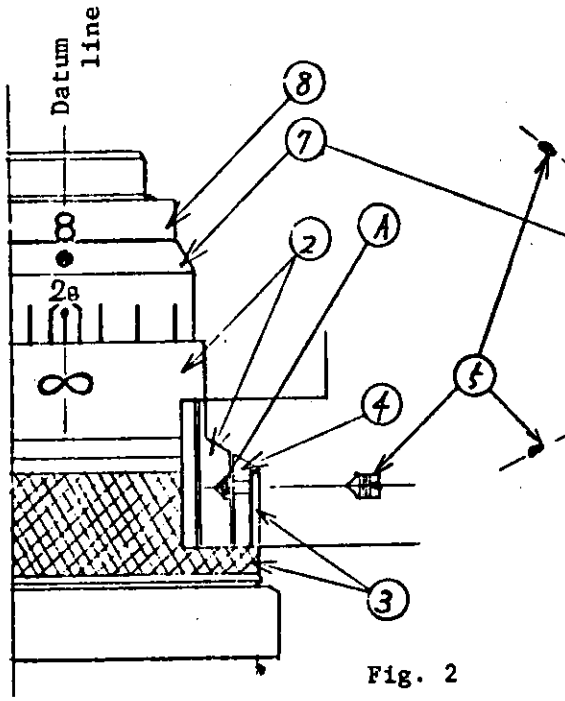


Fig. 2

5	5063026	Set screw	3				
4	1210252	Helicoid scale ring	1				
3	1210512	Leatherette	1	8	1210335	Aperture ring	1
2	1210284	Helicoid scale	1	7	1210295	Depth of field scalr ring	1
1	1710010	Helicoid with lens mounted	1	6	1242602	Rear cap	1

ORDER NO.

PROCESS: Completed 75mm lens

JOB : Mounting of helicoid scale and leatherette

[Step 3]

Drill 2 holes large enough to accommodate the tip of set screw (5) on the helicoid scale with the tap hole of the helicoid scale ring used as guide by using a hand drill of which blade angle is 90°.

[Step 4]

Tighten set screws (5) at 2 places with locktite applied with care exercised not to deform the helicoid scale (2).

[Step 5]

Place a piece of leatherette over the groove of the helicoid scale ring (4) with care exercised not to have the edge of leatherette (3) extended from the helicoid scale ring (4).

[Step 6]

Lightly paste together the leatherette (3) and the helicoid scale ring (4) wind bond (diabond 1880C). Bond should be spread over the entire circumference.