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Oil for slow governor:  
Oel für Hemmwerk:  
Huile pour échappement:

Oil/Oel/Huile 1-02  
Nyes Astro Batch 10939  
MIL-L-3918

Purchase from SINAR or  
Bezug von SINAR oder William F.NYE Inc.  
Achat chez SINAR ou NEW BEDFORD MASS USA

For COPAL shutter in general: Special grease EB 5  
(do not use for slow governor!)

allgem. für Copal Verschluss: Spezialfett EB 5  
(nicht für Hemmwerk verwenden!)

Pour l'obturateur COPAL en général: Graisse spéciale EB 5  
(ne pas utiliser pour echappement!)

Circular letter V 430

to the SINAR service stations

Mr/bm

April 29th, 1986

ADDENDUM TO SERVICE INSTRUCTIONS  
MODIFICATION INSTRUCTIONS FOR DIGITAL SHUTTERS

Ladies and Gentlemen

For reasons of better protection of the digital shutter against damaging influences by electrostatic discharges all new and repaired shutters were delivered with a modification since May 1985.

We learnt from practical use that these new measurements considerably improved the reliability.

Therefore, it is absolutely necessary that all the shutters delivered before May 1985 or repaired by SINAR before that date will be gradually brought up to this latest state. Please note that every shutter which arrives in your service station should strictly be checked for the following points:

1. Every print without the indication Ge02 or Ge03 on the soldering-side of the masterprint needs to be sent back to SINAR for modification.
2. The foil behind the switch print (Pos. 61 acc. to service sheet 0905-5) must be replaced (order nr. 522.11.359a).
3. The green stranded wire to the housing is dropped and will be removed at the occasion of the modification of the print at SINAR.
4. The new yellow stranded wire is to be connected with the drive unit. The cable socket has to be mounted between the spacing-bolt on the printed circuit board and below the base plate of the drive unit. This spacing-bolt will be shortened on the occasion of the modification of the masterprint at SINAR.
5. The automatic cable releases 522.11.002/003/004/012 have to be sent to SINAR for the modification for protection against electrostatic discharges (metal-parts are being replaced with synthetic material)
6. If not realized yet, new light and reinforced blades 522.11.494 should to be mounted. With this operation, the drive unit 522.11.081, identifiable by the two centering bolts for the driving

motor for the blades (service sheet 0905-3), as well as two new damping disks (522.11.390) have to be mounted and adjusted. Remove the driving segments acc. to 0905.05. In addition, lift the driving ring with 6 washers 166.33.064 acc. to sheet 0905.4 (pos. 68) by 0,3 mm.

For this modification work take care that you always dispose of sufficient spare parts and material for exchange.

In principle, we however maintain the former custom to send the entire shutter system to SINAR for repair because in many case, we are better equipped for exchanges and/or testings. In addition, the condition of the shutter can be better judged by us.

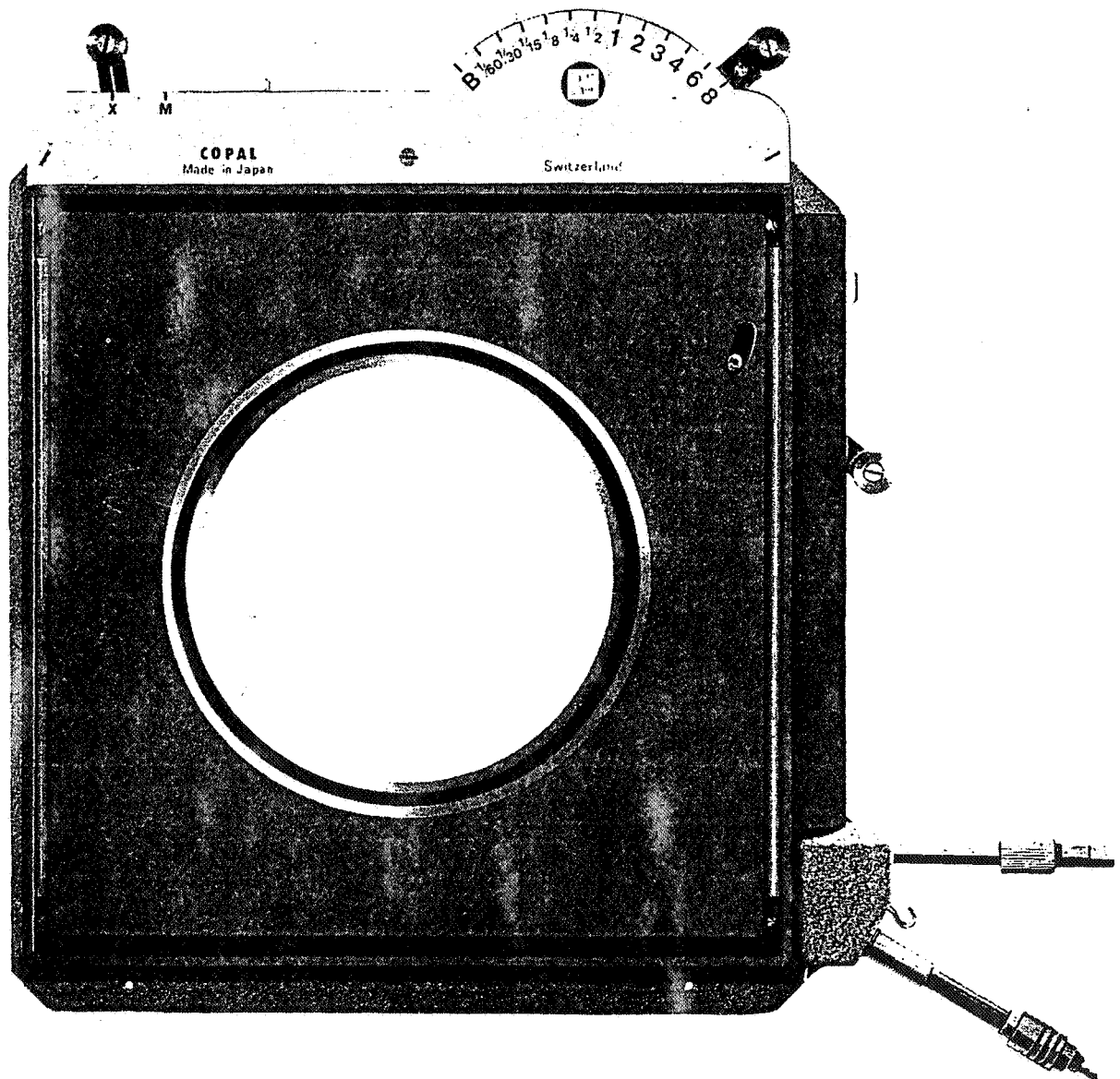
We would not miss to thank you for your support in extending an impeccable service to our customers and your valuable co-operation.

With our best regards, we remain,

SINAR AG SCHAFFHAUSEN  
*R. Meyer* *R.R. Müller*  
R. Meyer R.R. Müller

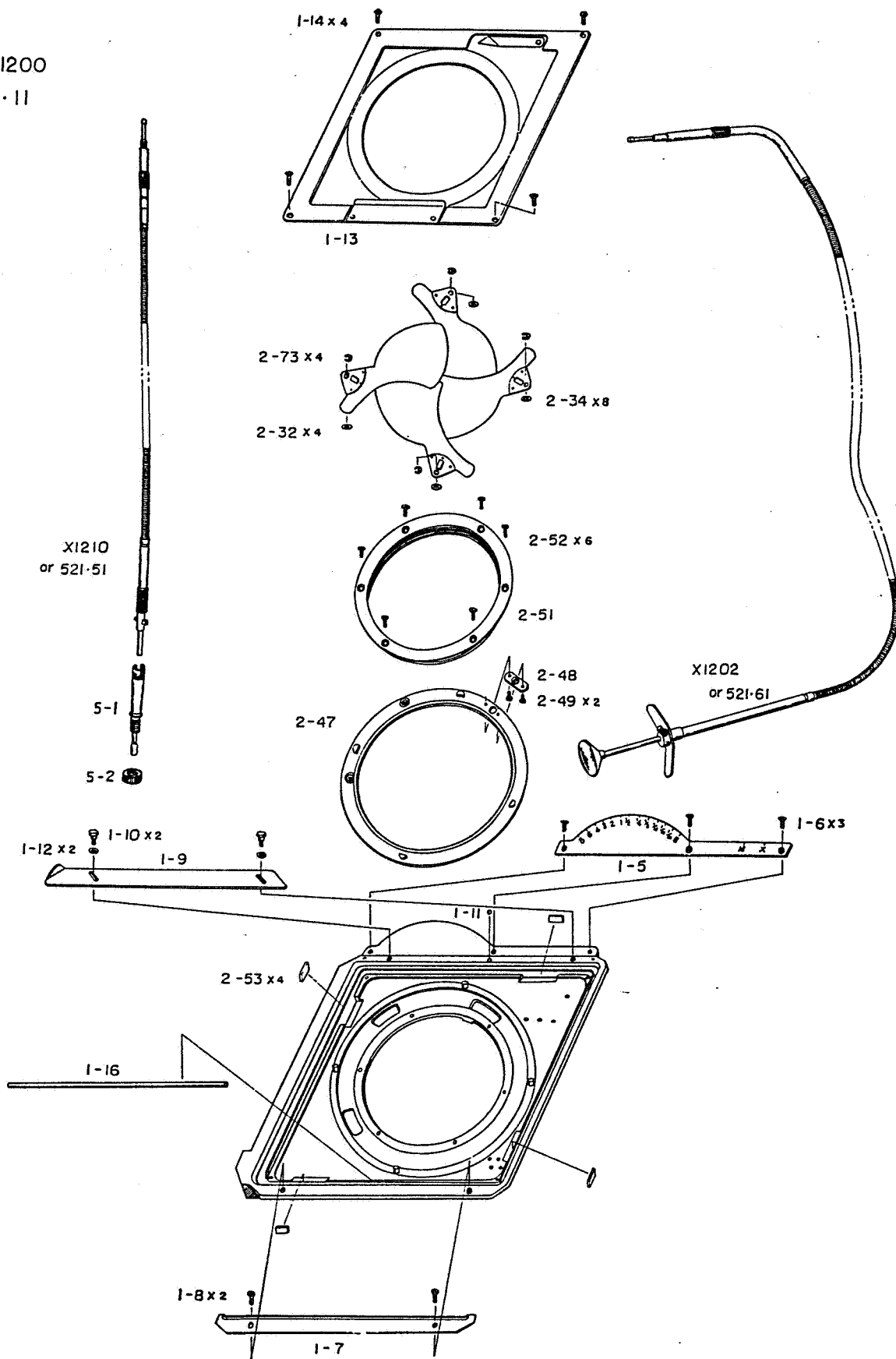
0901

**SINAR**  
**Color Automatic Shutter**  
**X1200 (or 521.11)**





X 1200  
521-11



PART No.	DRAWING No.	PART NAME	QUAN.	
1 - 1	D2 - 216	Front cover plate	ケース	1
2	D4 - 2108	Packing A	パッキングA	2
3	Z4 - 2201	Screw	平小ネジM1.7×8	4
4	D3 - 212	Speed graduation plate A	飾り板A	1
5	D4 - 2101	Speed graduation plate B	飾り板B	1
6	Z4 - 2202	Screw	皿小ネジM1.7×3.9	9
7	D4 - 2102	Border plate A	シャッタ取付板A	1
8	Z4 - 2203	Screw	丸平小ネジM2.3×4	6
9	D4 - 2103	Border plate B	シャッタ取付板B	1
10	D4 - 2104	Border plate B screw	シャッタ取付板Bネジ	2
11	Z4 - 1451	Steel ball 3φ	小径鋼球 3.0 mm並球	1
12	Z4 - 3217	Washer	平座金3.1φ×0.1	2
13	DA4- 2105	Rear cover plate assembly	カバー組立	(1)
14	Z4 - 2204	Screw	皿小ネジM1.7×3.7	4
15	D4 - 2109	Hook bolt	フック	1
16	D4 - 2334	Packing B	パッキングB	1
2 - 1	DA2- 221	Base plate assembly	プレート組立	(1)
2	D4 - 2211	Stopper	テンションストッパー	1
3	D4 - 2212	Holder	ストッパー押え	1
4	D4 - 2292	Adjustment washer	テンション調整座	1
5	Z4 - 2205	Screw	平小ネジM2×4	2
6	DA4- 2213	Slide bar sub assembly	開閉補助レバー組立	(1)
7	D4 - 2216	Slide bar spring	開閉補助レバーバネ	1
8	D4 - 2217	Screw	開閉補助レバーバネネジ	1
9	DA4- 2219	Closing lever assembly	開閉レバー下組立	(1)
10	D4 - 2223	Translation pin	移動ピン	1
11	D4 - 2224	Translation collar	移動ピンカラン	1
12	D4 - 2225	Translation pin spring	移動ピンバネ	1
13	Z4 - 7840	Screw	平小ネジM1.4×2	2
14	D4 - 2227	Crown (Toothed wheel) A	菊A	1
15	D4 - 2228	Crown (Toothed wheel) B	菊B	1
16	D4 - 2229	Closing lever spring	開閉レバーバネ	1
17	D4 - 2230	Collar	開閉レバーカラン	1
18	Z4 - 3201	Washer	平座金4.6φ×0.1	1
19	DA4- 2231	Tension adjustment lever assembly	調時レバー組立	(1)
20	D4 - 2235	Collar	調時レバーカラン	1
21	DA4- 2236	Click lever assembly	クリックレバー組立	(1)
22	D4 - 2238	Click spring	クリックバネ	1
23	DA4- 2243	B lever assembly	Bレバー組立	(1)
24	D4 - 2245	Collar	Bレバー間座	1
25	D4 - 2246	Spring	Bレバーバネ	1
26	D4 - 2240	B shift lever	B作動レバー	1
27	D4 - 2241	Collar	B作動レバーカラン	1
28	D4 - 2242	Spring	B作動レバーバネ	1
29	D4 - 2247	Screw	B作動レバーバネ掛け	2
30	D4 - 2248	Sector ring stopper	セクターリングストッパー	1
31	D4 - 2249	Screw	セクターリングストッパー取付ネジ	1
32	DA4- 2255	Shutter blade assembly	羽根組立	(4)
33	D4 - 2256	Cushion	緩衝片	1
34	Z4 - 1275	Washer	平座金3.1φ×0.1	9
35	DA4- 2257	Charge lever assembly	ボデーレバー組立	(1)
36	D4 - 2264	Charge lever spring	ボデーレバーバネ	1
37	D4 - 2265	Screw	ボデーレバースプリング掛けネジ	1
38	D4 - 2266	Charge lever holder	ボデーレバー押え	1
39	Z4 - 9216	Screw (for charge lever holder)	平小ネジM1.7×2.6	1
40	D4 - 2267	Screw	ボデーレバー押えネジ	1
41	D4 - 2268	Roller	レリーズローラー	1
42	D4 - 2269	Collar	レリーズローラー間座	1
43	D4 - 2270	Screw (for release roller)	レリーズローラー取付ネジ	1



PART No.	DRAWING No.	PART NAME	QUAN.
2-44	D4-2271	Piston shift lever	ピストン外レレバー 1
45	D4-2272	Collar	ピストン外レレバー間座 1
46	D4-2273	Spring	ピストン外レレバーバネ 1
47	DA4-2274	Sector ring assembly	セクターリング組立 (1)
48	D4-2279	Guidance collar	リング補強カラン 1
49	Z4-2206	Screw	平小ネジM1.7×1.8 2
50	D4-2280	Sector ring spring	セクターリングバネ 1
51	D2-225	Lens mounting tube	鏡 胴 1
52	Z4-1392	Screw (for lens mounting tube)	一秒ギヤプレート取付ネジ 6
53	D4-2281	Shutter blade stopper	羽根ストッパー 4
54	DA3-221	Speed change cam assembly	変速リング組立 (1)
55	D4-2290	Crown (Toothed wheel) C	菊C 1
56	D4-2291	Crown (Toothed wheel) D	菊D 1
57	DA3-231	Tension ring assembly	テンションリング組立 (1)
58	D4-2310	Tension ring stopper	テンションリングストッパー 1
59	Z4-2207	Screw (for tension ring stopper)	皿小ネジM2×2.7 2
60	DA4-2330	Piston assembly	ピストン組立 (1)
61	D4-2308	Spring	ピストンバネ 1
62	D4-2311	Bushing	ギヤ切替ブッシュ 1
63	D4-2312	Main spring	テンションバネ 1
64	DA4-2313	Main cocking lever assembly	テンションレバー組立 (1)
65	D4-2319	Signal rod	シグナルレバー 1
66	Z4-2208	Screw	平小ネジM2×5 1
67	DA4-2326	Bounce stop lever assembly	バウンド止めレバー組立 (1)
68	D4-2321	Bounce stop lever spring	バウンド止めレバーバネ 1
69	D4-2322	Collar	バウンド止めレバーカラン 1
70	Z4-3203	Washer	平座金4.1φ×0.1 1
71	D4-2323	Shift lever	バウンド止め補助レバー 1
72	D4-2324	Shift lever spring	バウンド止め補助レバーバネ 1
73	D4-1402	Snap ring	スナップリング 2.3φ×0.6 8
74	Z4-1403	Snap ring	スナップリング 1.5φ×0.4 5
3-1	DA4-2455	Slow governor assembly	ギヤブロック組立 (1)
4-1	D4-2502	Synchro contact lever	切替接点レバー 1
2	D4-2503	Synchro contact A	切替接片A 2
3	D4-2504	Insulator A	切替絶縁座A 3
4	D4-2505	Insulator B	切替絶縁座B 1
5	D4-2506	Insulator C	切替絶縁座C 2
6	Z4-2212	Screw	平小ネジM1.7×6.6 2
7	D4-2507	Crown (Toothed wheel) E	菊E 1
8	D4-2508	Crown (Toothed wheel) F	菊F 1
9	D4-2522	Contact spring	接片補強板 2
10	D4-2509	Collar	切替接点レバー間座 1
11	Z4-6304	Steel ball 2φ	2φ ボール 1
12	D4-2511	Insulator D	切替絶縁座D 2
13	D4-2512	Synchro contact B	切替切片B 1
14	D4-2513	Synchro contact C	切替切片C 1
15	D4-2515	Flash lead wire	リード線0.8φ×265 1
16	D4-2516	Flash lead wire	リード線0.8φ×125 2
17	D4-2517	Insulation tube	絶縁ブッシュ 2
18	D4-2519	Fixing washer	コード取付ワッシャー 2
19	D4-2520	Synchro cord spring	コードロ金バネ 1
20	D4-2521	Synchro cord screw	コードロ金 1
21	DA4-2446	Synchro plug assembly	シンクロソケット組立 (1)
22	D4-2447	Synchro socket	シンクロソケット 1
5-1		Bayonet assembly	バヨネット筒金組立 (1)
2	Q4-2028	Lock nut	ロックナット 1
6-36	DA4-2457	Turning Plate assembly	

## INSTRUCTIONS FOR REPAIRS

### (A) Cleaning of Shutter

All parts of the shutter can be disassembled and cleaned down to the part indicated in the disassembling diagram. However, soldered and glued parts should not be disassembled unless necessary. (Be careful of the fact that screw **2-40** is a left-handed screw.)

#### (a) Metal Parts

- (1) Metal parts or metal plated parts are soaked in clean trichloroethylene or perchloroethylene liquid and cleaned.
  - (2) Parts treated with a solid lubricant (shutter blade assembly **2-32** rear cover plate assembly **1-13**) are wiped with a cloth soaked in benzine or alcohol.
  - (3) The coated surface of painted parts (base plate assembly **2-1**) are wiped with soft, dry cloth, silicone cloth or chamois leather. Other places are wiped with cloth soaked in benzine or alcohol.
  - (4) Metal parts on which synthetic resins and rubber are assembled (charge lever assembly **2-35**, main cocking lever assembly **2-64**, flash lead wire **4-15** and **4-16**, synchro plug assembly **4-21**) are wiped with a cloth soaked in benzine or alcohol. At this time, be careful not to touch the synthetic resin and rubber parts. [Use this method of wiping for tension ring assembly **2-57** because bushing **2-62** is pressfitted therein. However, if bushing **2-62** is to be replaced, it can be soaked in cleaning liquid as mentioned in (1)].
- (b) Synthetic resins and rubber (front cover plate **1-1**, packing A **1-2**, packing B **1-16**, stopper **2-2**, shutter blade stopper **2-53**, insulator A **4-3**, insulator B **4-4**, insulator C **4-5**, insulator D **4-12**, insulation tube **4-17**) are wiped with soft, dry cloth, silicone cloth or chamois leather.

### (B) Oiling

Proper and accurate shutter functioning and performance can be maintained only with the use of specified lubricants. Therefore, do not use lubricants other than those specified. (Lubricants will be supplied if necessary.)

#### (a) Gear Oil (synthetic lubricant Di Octyl Sebacate)

- (1) Properly oil the gear bearing part, the anchor bearing part, the roller and other bearings of the slow governor assembly with a very small oiler.
- (2) Properly oil the tension adjustment lever assembly and click lever assembly rollers with a small brush or a very small oiler.
- (3) Properly oil the ball bearings of the tension ring assembly with a very small oiler.

#### (b) Grease (specially synthesized EB-5) \* Graphite powder

- \* (1) Apply to the sliding surfaces of the sector ring and the lens mounting tube. Be careful to apply uniformly.
- \* (2) Apply a small amount uniformly to the sliding surface of the base plate assembly which comes into contact with the sector ring.
- (3) Apply to the sliding surface of the base plate assembly which comes into contact with the charge lever assembly.
  - (4) Apply to the surface of the base plate assembly on which the steel ball  $2\phi$  of the synchro contact lever slides.
  - (5) Apply to all the shafts and mortises of the levers of the base plate assembly for their proper operation.
  - (6) Apply to the sliding surface of the base plate assembly which comes into contact with the piston shift lever.
  - (7) Apply to the contact surface where the closing lever hits the bounce stop lever.
  - (8) Apply to the contact surface between the B lever and the charge lever.
  - (9) Apply to the contact surface between the B shift lever and the B lever.
  - (10) Apply to the engaging surface between the tension ring and the cutting pawl.
  - (11) Apply to the sliding surface between the roller and the collar.
  - (12) Apply to the contact surface between the piston shift lever and the stud of the tension ring.
  - (13) Apply to the contact surface between the main cocking lever and the stopper.
  - (14) Apply to the working surface between the ball bearings of the tension ring and the lens mounting tube.
  - (15) Apply to the contact surface where the tension ring hits the slow governor.
  - (16) Apply to the sliding surface between the speed change cam and the lens mounting tube.
  - (17) Apply to the sliding surface between the border plate B and the steel ball  $3\phi$ .

For details other than the slow governor assembly, refer to the lubricating chart.

## (C) Binding

Refer to the detailed chart on binding.

(a) Parts to be glued with neoprene type binding agent.

- (1) Packing A **1-2**
- (2) Packing B **1-16**
- (3)
- (4) Shutter blade stopper **2-53** (four pieces)
- (5) Flash lead wire **4-15, 4-16** (two pieces)

(b) Parts on which Stadlock (manufactured by Loctite Corporation, U.S.A.) or similar binding agents are applied to the screws when assembling.

- (1) Screw for charge lever holder **2-39**
- (2) Screw for release roller **2-43**
- (3) Screw for lens mounting tube **2-52**
- (4) Screw for tension ring stopper **2-59**

(c) Apply Stadlock or similar binding agents to the anchor B adjusting screw of the slow governor assembly when adjusting shutter speeds.

(d) Parts to be glued with Atlas 500 binding agent

- (1) Cushion **2-33**

## (D) Assembly and Adjustment

(a) When sector ring assembly **2-47** is assembled into base plate assembly **2-1**, together with lens mounting tube **2-51**, sector ring assembly **2-47** should be smoothly functioning within the working range without catches or creaks. Since this greatly affects the shutter speed, close attention is required as stated in (B) (b) (1) and (B) (b) (2).

The assembling position of lens mounting tube **2-51** and base plate assembly **2-1** is at the wide part of the bayonet of lens mounting tube **2-51**, as shown in Fig. 1.

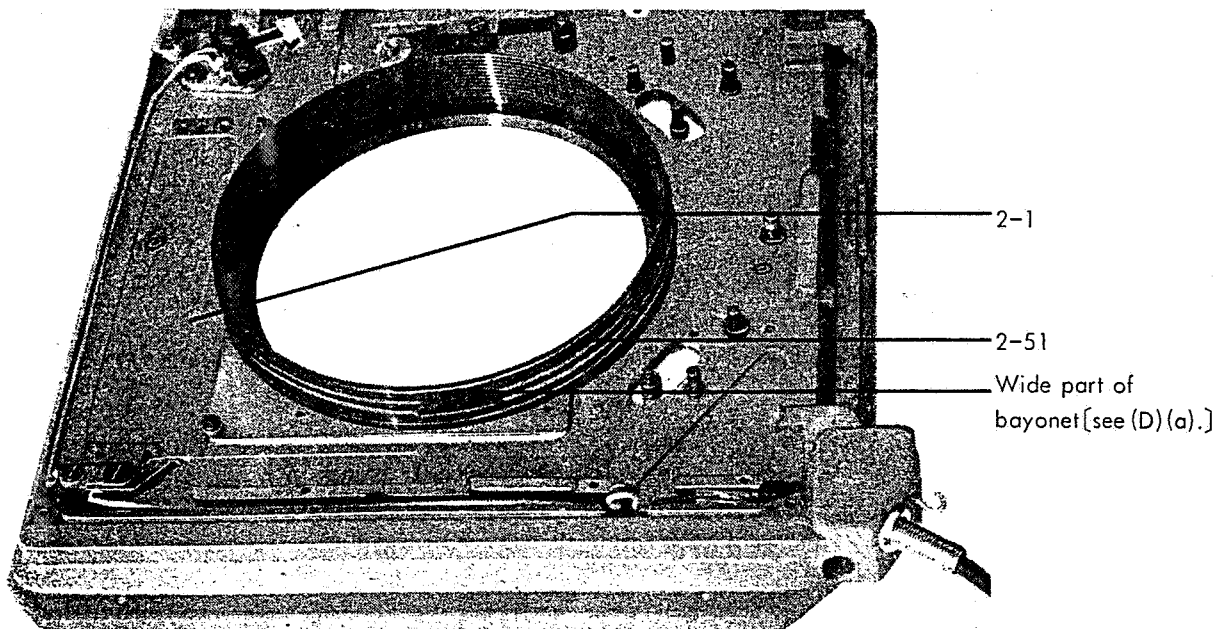


Fig. 1

(b) After assembling sector ring assembly **2-47** and lens mounting tube **2-51** into base plate assembly **2-1**, oil absolutely should not adhere to each surface on which shutter blade assembly **2-32** slides. If oil should adhere to these surfaces, wipe them off with cloth soaked in trichloroethylene or perchloroethylene.

(c) When assembling shutter blade assembly **2-32**, be careful of the direction in which the blade tip is bent and the order of assembly. Assemble it according to Fig. 2.

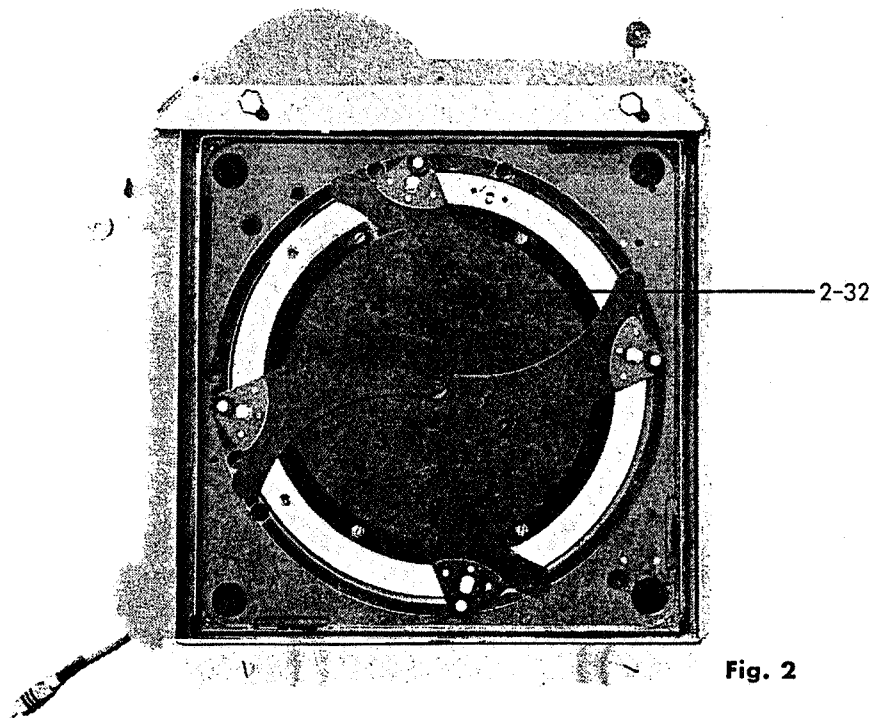


Fig. 2

- (d) To adjust synchro contact B **4-13** and synchro contact C **4-14**, set the shutter speed at B. When charge lever assembly **2-35** is operated to maximum, both of the synchro contacts should come into contact accurately. When charge lever assembly **2-35** is not operated, there should be a 0.5–1 mm gap between the synchro contacts.
- (e) To adjust the contact timing for the two pieces of synchro contact A **4-2** and the contacting part of main cocking lever assembly **2-64**, align the index mark of synchro contact lever **4-1** to X, set the shutter speed at B and operate charge lever assembly **2-35** for opening of shutter blades. When the blade tips open up to the range of 2.5 to 0.5 mm before full opening of 75φ mm aperture, adjust two pieces of synchro contact A **4-2** so that those contacts may come into contact accurately as shown in Fig. 3.

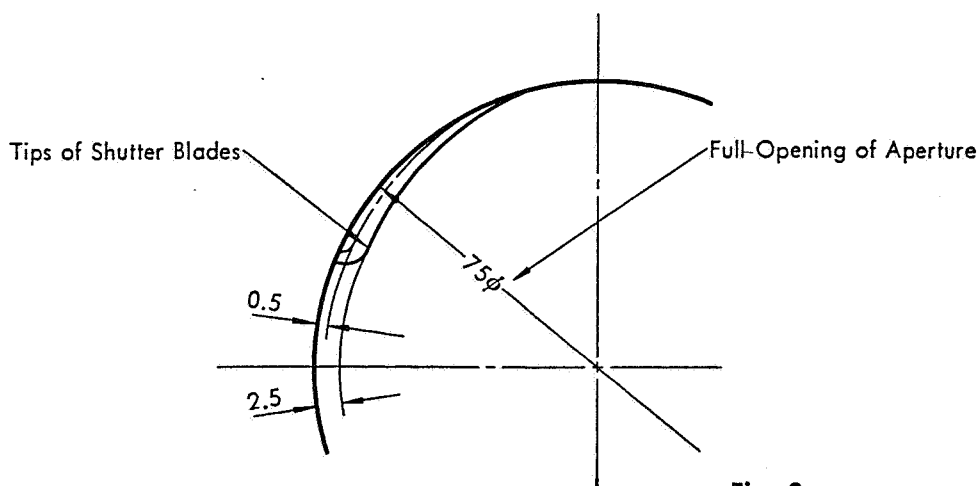
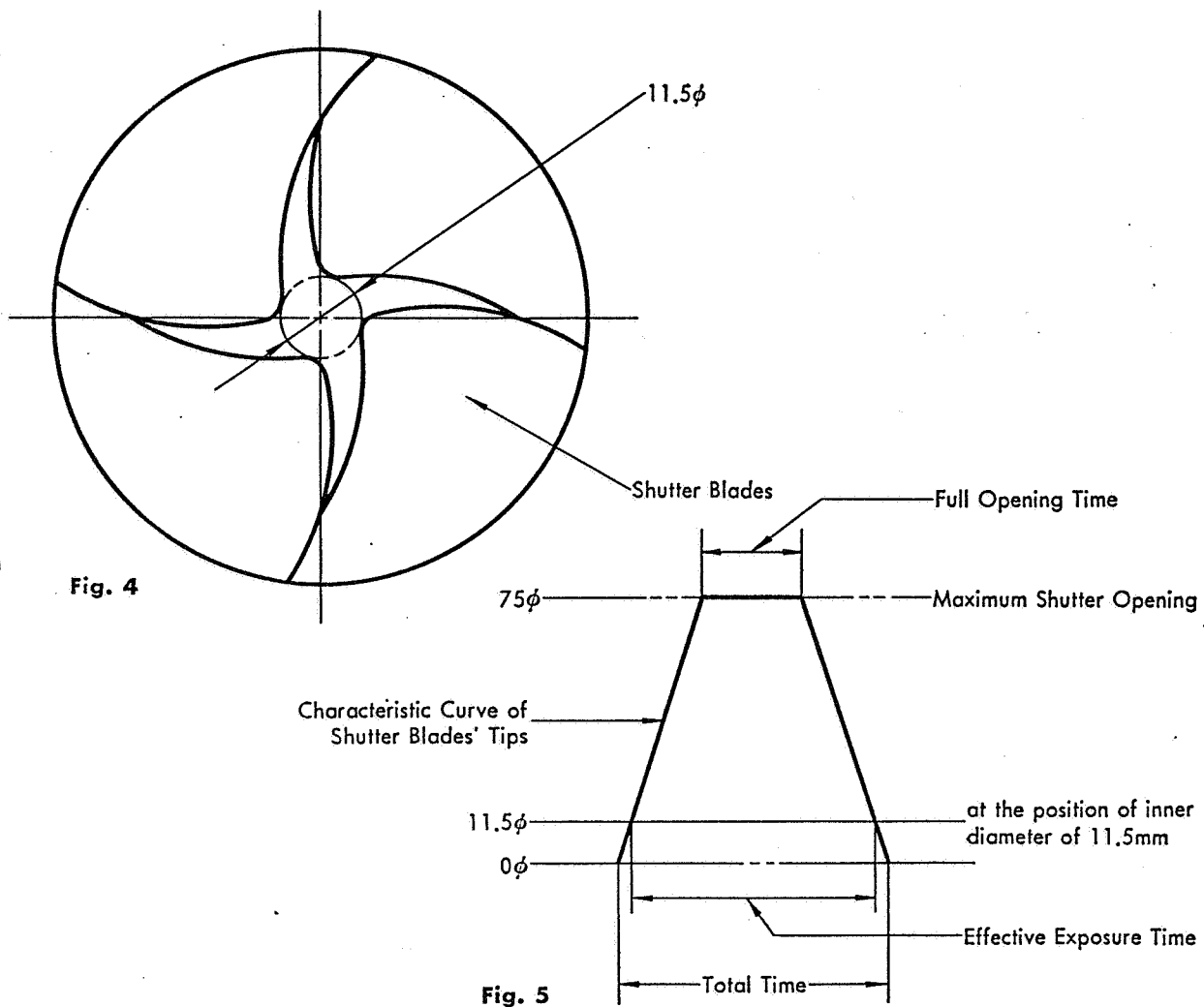


Fig. 3

- (f) Adjust Synchro contact A **4-2** (2 pieces), synchro contact B **4-13** and synchro contact C **4-14** so that the synchro contact efficiency is 70% or more at X for the contacting time of 1 mS, and 70% or more at M for the contacting time of 2.5 mS. However, be careful that it does not affect the other functions of the shutter.
- (g) Unlike ordinary lens shutters, this shutter is corrected for over-exposure at smaller apertures. Therefore, the exposure time indicates the time required from when the tips of shutter blades start to open and reach an inner diameter of 11.5 mm to when they reach 11.5 mm again before their closing. (See Fig. 4 and Fig. 5)



(1) The tolerances of exposure times are given hereunder:

SHUTTER SETTING (Sec.)	NOMINAL (mS)	UPPER LIMIT (mS)	LOWER LIMIT (mS)
1/60	15.625	20.313	10.938
1/30	31.25	40.625	21.875
1/15	62.5	75	50
1/ 8	125	150	100
1/ 4	250	300	200
1/ 2	500	550	450
1	1000	1100	900
2	2000	2200	1800
3	3000	3300	2700
4	4000	4400	3600
6	6000	6600	5400
8	8000	8800	7200

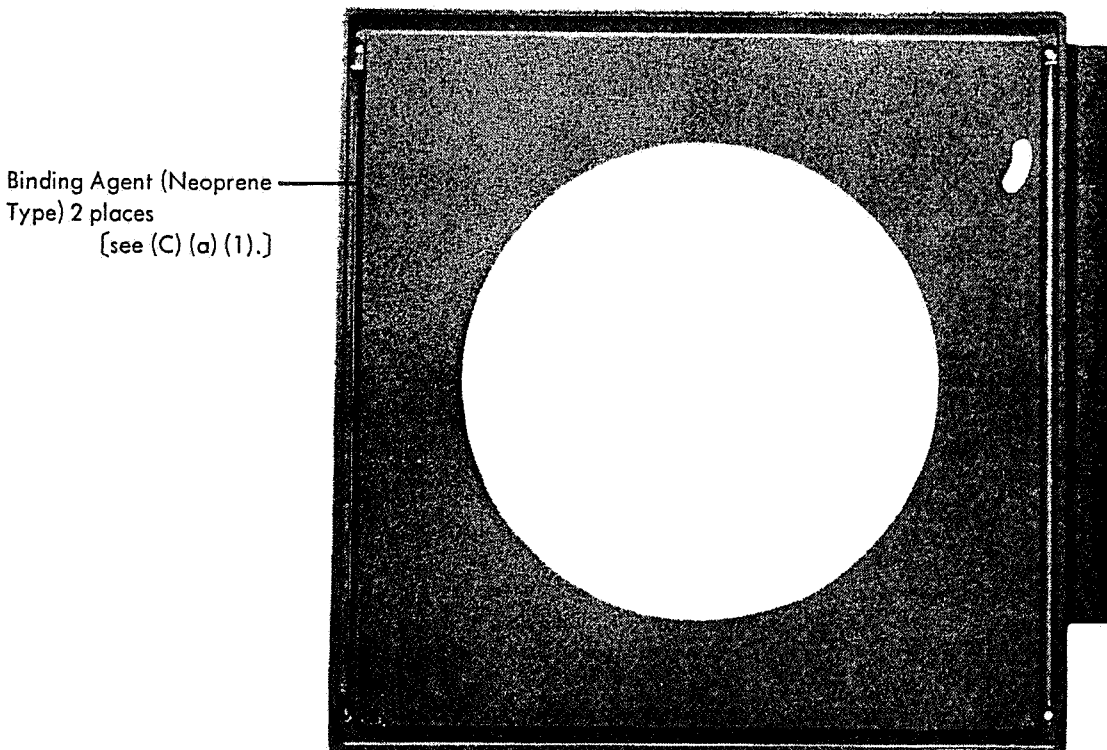
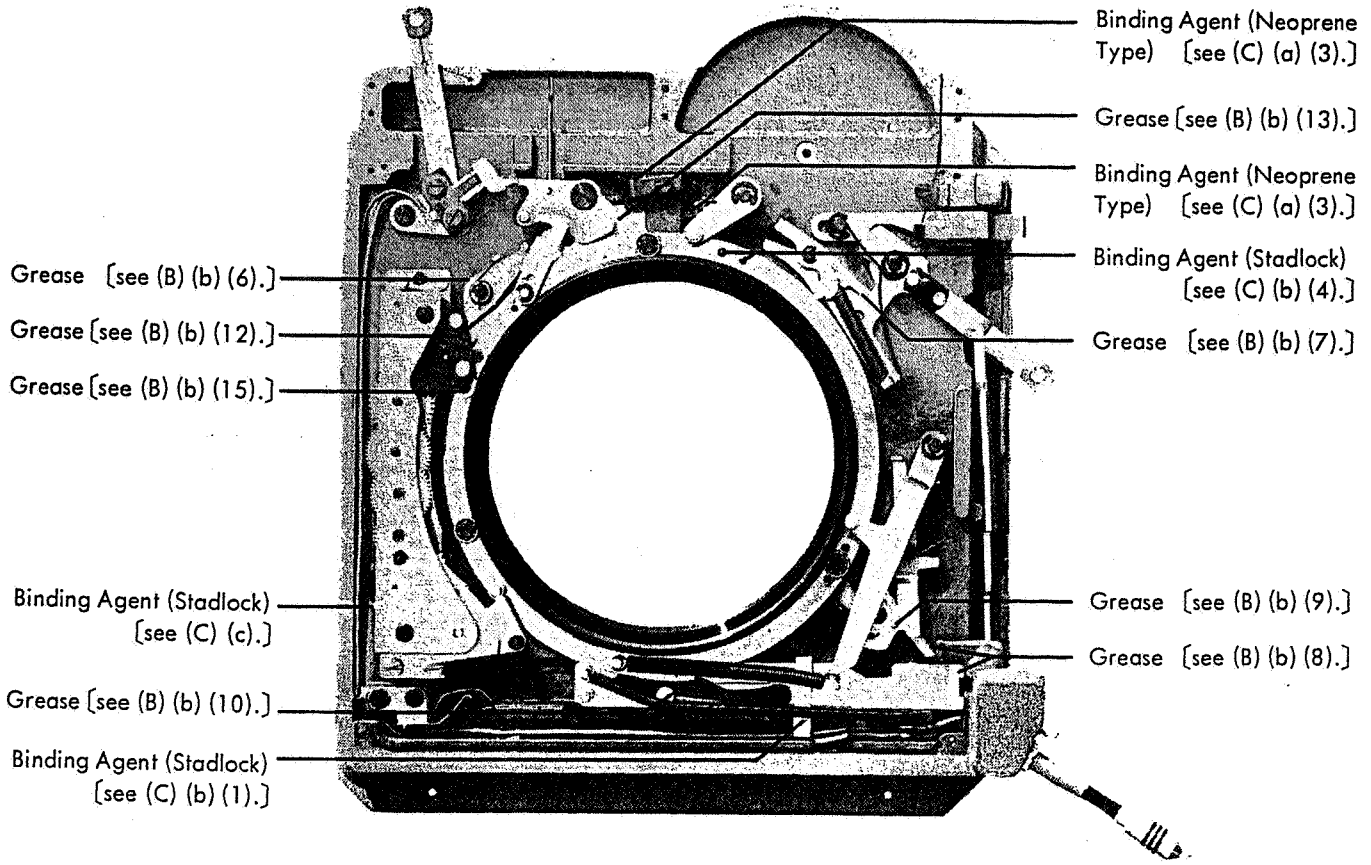
(2) Adjustment at 8 seconds is performed with the anchor adjustment B screw of slow governor assembly 3-1. After adjustment has been completed, securely glue the screw.

## (E) Repair Instructions

The main troubles, causes and repair methods are given in the following chart. Perform accurate repairs to all troubles.

TROUBLE	CAUSE	REPAIR METHOD
Shutter cannot be released	<ol style="list-style-type: none"> <li>1) Tension ring and engaging part of hook lever are worn out.</li> <li>2) Piston or tension ring is loose or warped and the piston rotates in reverse.</li> <li>3) Charge lever spring is not engaged to spring hook.</li> <li>4) Charge lever spring is broken.</li> <li>5) Dust has adhered to the surfaces between the charge lever and base plate, or the charge lever does not return due to insufficient oil.</li> <li>6) Main spring is broken.</li> </ol>	<ol style="list-style-type: none"> <li>1) Replace tension ring assembly <b>2-57</b> or charge lever assembly <b>2-35</b>.</li> <li>2) Replace piston assembly <b>2-60</b> or tension ring assembly <b>2-57</b>.</li> <li>3) Reengage the spring. If it is easily disengaged, repair the shape of the hook part of the spring.</li> <li>4) Replace charge lever spring <b>2-36</b>.</li> <li>5) Rinse and oil [(B) (b) (3)].</li> <li>6) Replace main spring <b>2-63</b>.</li> </ol>
1/60 sec. slow	<ol style="list-style-type: none"> <li>1) Grating of sector ring.</li> <li>2) Grating of tension ring when rotating.</li> </ol>	<ol style="list-style-type: none"> <li>1) Rinse and oil [(B) (b) (1)], sector ring assembly <b>2-47</b>.</li> <li>2) Rinse tension ring assembly <b>2-57</b> and oil [(B) (a) (3)] bearings, etc.</li> </ol>
Faulty speeds (excluding 1/60 sec.)	<ol style="list-style-type: none"> <li>1) Insufficient oil in bearings and other parts.</li> <li>2) Bearings of slow governor are damaged or out of adjustment due to abrasion of gears.</li> <li>3) Rivet of slow speed plate of tension ring is loose.</li> </ol>	<ol style="list-style-type: none"> <li>1) Oil [(B) (a) (1)].</li> <li>2) Replace slow governor assembly <b>3-1</b>.</li> <li>3) Replace tension ring assembly <b>2-57</b>.</li> </ol>
Shutter blades do not close at B	<ol style="list-style-type: none"> <li>1) B lever is bent where it hits the charge lever.</li> <li>2) Contact section between B lever and charge lever catches.</li> </ol>	<ol style="list-style-type: none"> <li>1) Repair the bent in B lever assembly <b>2-23</b>.</li> <li>2) Oil contact surface between B lever assembly <b>2-23</b> and charge lever assembly <b>2-35</b> [(B) (b) (8)].</li> </ol>
Malfunction of synchro contact	<ol style="list-style-type: none"> <li>1) Soldered part has come loose or line disconnection.</li> <li>2) Disconnection of flash lead wire.</li> <li>3) Foreign matter has adhered to various contacts.</li> <li>4) Loose screw on synchro plug assembly head.</li> </ol>	<ol style="list-style-type: none"> <li>1) Resolder.</li> <li>2) Replace flash lead wire <b>4-15</b>, <b>4-16</b>.</li> <li>3) Rinse each contact [(A) (a) (1)].</li> <li>4) Tighten screw of synchro plug assembly <b>4-22</b>.</li> </ol>
Back of shutter blade catches on lens mounting tube	<ol style="list-style-type: none"> <li>1) Big overlap of shutter blades.</li> </ol>	<ol style="list-style-type: none"> <li>1) Adjust so that main cocking lever hits faster by replacing or adding stopper <b>2-2</b> and adjustment washer <b>2-4</b>.</li> </ol>



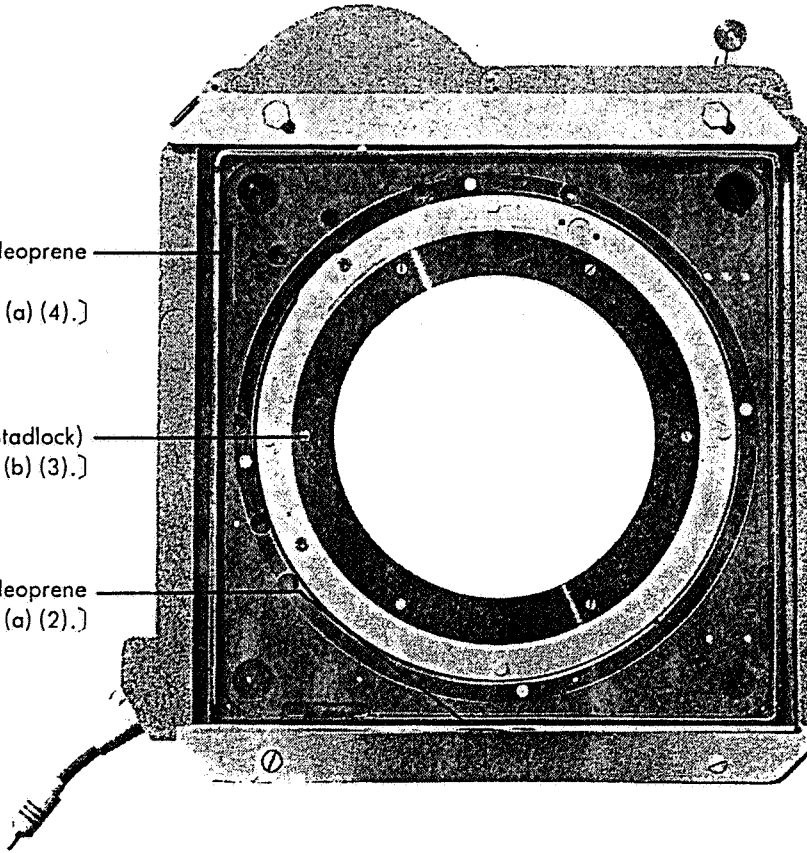




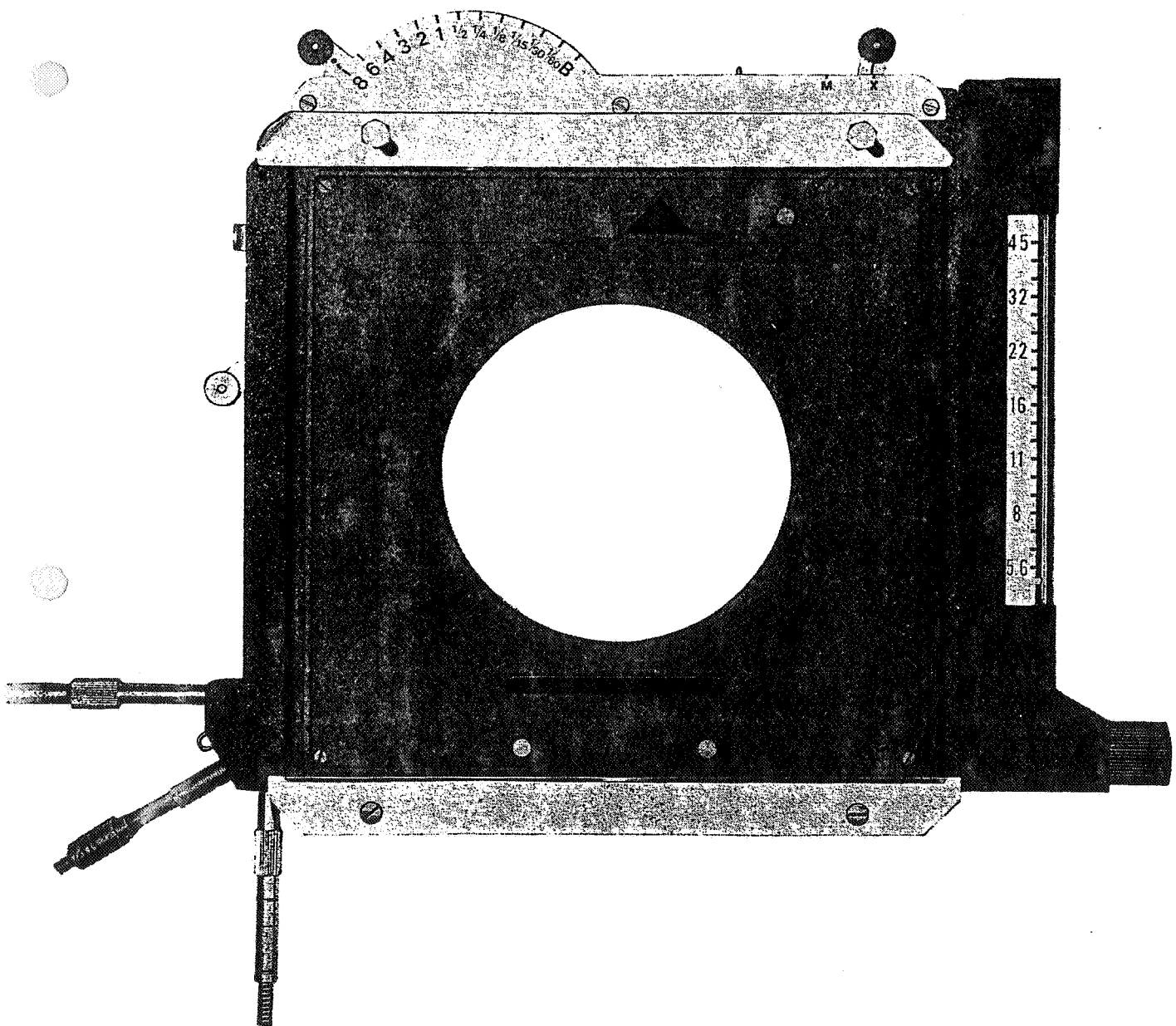
Binding Agent (Neoprene  
Type) 4 places  
[see (C) (a) (4).]

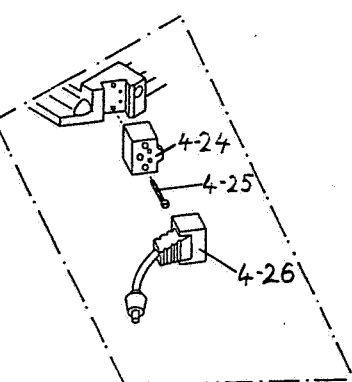
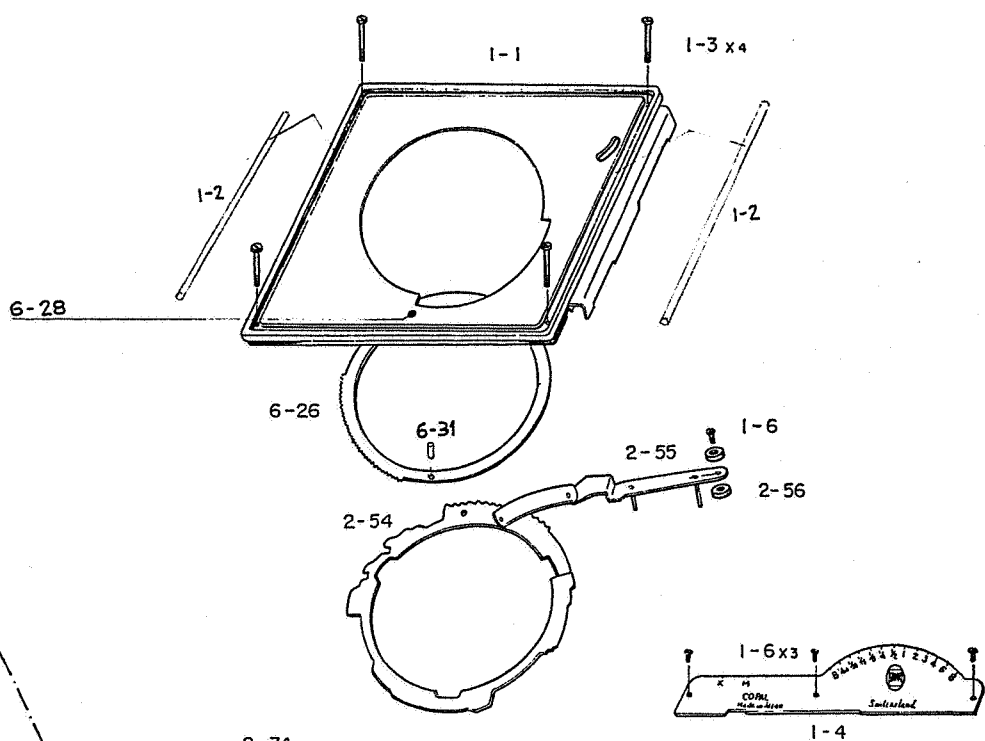
Binding Agent (Stadlock)  
6 places [see (C) (b) (3).]

Binding Agent (Neoprene  
Type) [see (C) (a) (2).]

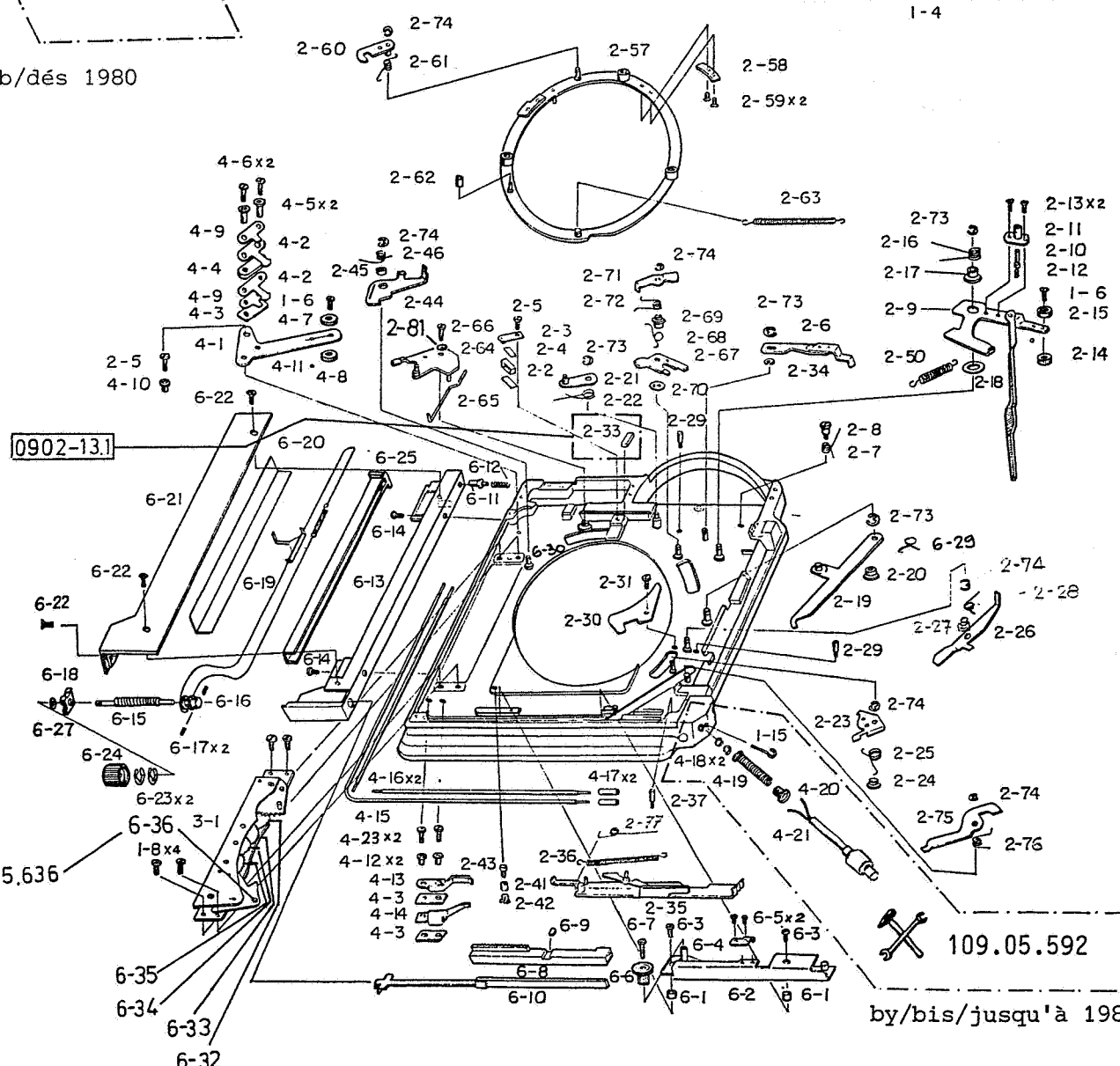


# SINAR Fully Automatic Shutter 521.31





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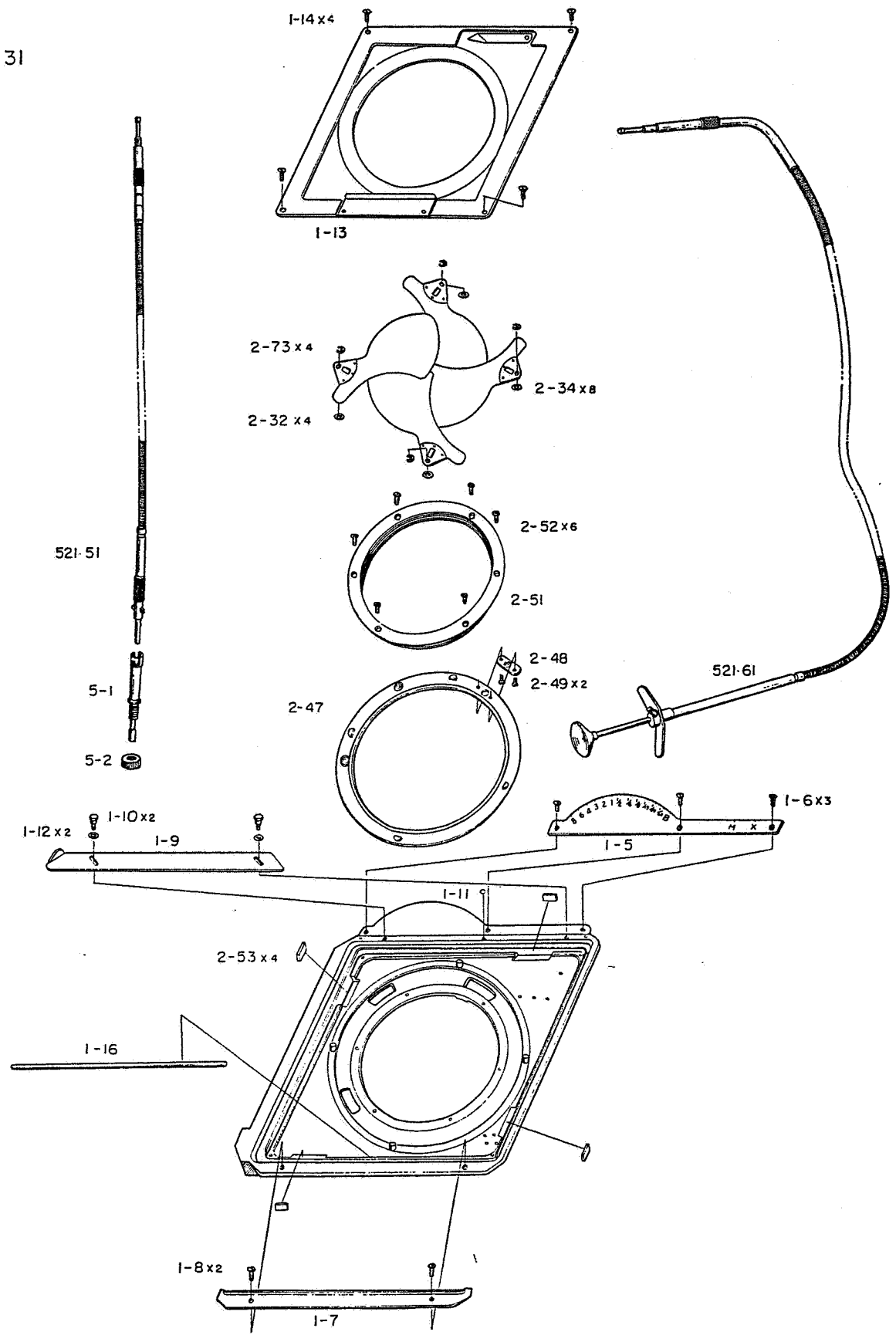
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521-31



PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
1 - 1*	DA4-2111	Front cover plate assembly	1	521.31.200	(1)
2	D4 - 2108	Packing A	2	500	2
3*	Z4 - 2282	Screw	3	501	4
4	D3 - 212	Speed graduation plate A	4	300	1
5	D4 - 2101	Speed graduation plate B	5	301	1
6	Z4 - 2202	Screw (1-17*)	6	502	9
7	D4 - 2102	Border plate A	7	302	1
8	Z4 - 2203	Screw	8	503	6
9	D4 - 2103	Border plate B (1-18*)	9	303	1
10	D4 - 2104	Border plate B screw	10	504	2
11	Z4 - 1451	Steel ball 3φ	11	505	1
12	Z4 - 3217	Washer	12	506	2
13	DA4-2105	Rear cover plate assembly	13	201	(1)
14	Z4 - 2204	Screw	14	507	4
15	D4 - 2109	Hook bolt	15	508	1
16	D4 - 2334	Packing B	16	509	1
17*	Z4 - 1205	Screw black!	17	510	9
18*	D4 - 2118	Border plate B	18	304	(1)
2 - 2	D4 - 2211	Stopper	19	305	1
3	D4 - 2212	Holder	20	306	1
4	D4 - 2292	Adjustment washer	21	511	1
5	Z4 - 2205	Screw	22	512	2
6	DA4-2213	Slide bar sub assembly	23	202	(1)
7	D4 - 2216	Slide bar spring	24	513	1
8	D4 - 2217	Screw	25	514	1
9*	DA4-2338	Closing lever assembly	26	203	(1)
10*	D4 - 2340	Translation pin	27	515	1
11	D4 - 2224	Translation collar	28	516	1
12	D4 - 2225	Translation pin spring	29	517	1
13	Z4 - 2791	Screw	30	518	2
14	D4 - 2227	Crown (Toothed wheel) A	31	519	1
15	D4 - 2228	Crown (Toothed wheel) B	32	520	1
16	D4 - 2229	Closing lever spring	33	521	1
17	D4 - 2230	Collar	34	522	1
18	Z4 - 3201	Washer	35	523	1
19*	DA4-2341	Tension adjustment lever assembly	36	204	(1)
20	D4 - 2235	Collar	37	524	1
21	DA4-2236	Click lever assembly	38	205	(1)
22	D4 - 2238	Click spring	39	525	1
23	DA4-2243	B lever assembly	40	206	(1)
24	D4 - 2245	Collar	41	526	1
25	D4 - 2246	Spring	42	527	1
26	D4 - 2240	B shift lever	43	307	1
27	D4 - 2241	Collar	44	528	1
28	D4 - 2242	Spring (6-29)	45	529	1
29	D4 - 2247	Screw	46	530	2
30	D4 - 2248	Sector ring stopper	47	308	1
31	D4 - 2249	Screw	48	531	1
32	DA4-2255	Shutter blade assembly	49	207	(4)
33	D4 - 2256	Cushion	50	532	1
34	Z4 - 1275	Washer	51	533	9
35*	DA4-2344	Charge lever assembly	52	208	(1)
36*	D4 - 2382	Charge lever spring	53	534	1
37*	D4 - 2348	Screw	54	535	1
41	D4 - 2268	Roller	55	536	1
42	D4 - 2269	Collar	56	537	1
43	D4 - 2270	Screw (for release roller)	57	538	1
44	D4 - 2271	Piston shift lever	58	309	1
45	D4 - 2272	Collar	59	539	1
46	D4 - 2273	Spring	60	540	1
47	DA4-2274	Sector ring assembly	61	209	(1)

PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
2-48	D4 - 2279	Guidance collar	62	521.31.311	1
49	Z4 - 2206	Screw	63	541	2
50	D4 - 2280	Sector ring spring	64	542	1
51*	D2 - 230	Lens mounting tube	65	543	1
52	Z4 - 1392	Screw (for lens mounting tube)	66	544	6
53	D4 - 2281	Shutter blade stopper	67	545	4
54*	DA3- 222	Speed change cam assembly	68	210	(1)
55	D4 - 2290	Crown (Toothed wheel) C	69	546	1
56	D4 - 2291	Crown (Toothed wheel) D	70	547	1
57	DA3- 231	Tension ring assembly	71	211	(1)
58	D4 - 2310	Tension ring stopper	72	312	1
59	Z4 - 2207	Screw (for tension ring stopper)	73	548	2
60	DA4- 2330	Piston assembly (2-80)	74	212	(1)
61	D4 - 2308	Spring	75	549	1
62	D4 - 2311	Bushing	76	550	1
63	D4 - 2312	Main spring	77	551	1
64	DA4-4241	Main cocking lever assembly	78	213	(1)
65	D4 - 2319	Signal rod	79	552	1
66	Z4 - 2208	Screw	80	553	1
67	DA4- 2326	Bounce stop lever assembly	81	214	(1)
68	D4 - 2321	Bounce stop lever spring	82	554	1
69	D4 - 2322	Collar	83	555	1
70	Z4 - 3203	Washer	84	556	1
71	D4 - 2323	Shift lever	85	313	1
72	D4 - 2324	Shift lever spring	86	557	1
73	D4 - 1402	Snap ring	87	314	8
74	Z4 - 1403	Snap ring	88	558	6
75*	D4 - 2351	Lock lever	89	315	1
76*	D4 - 2352	Lock lever spring	90	559	1
77	D4 2390	Spring	91	560	1
80*	DA4 2397	Piston assembly	92	215	1
81		Washer		166.30.089	1
3- 1*	DA4- 2455	Slow governor assembly	93	216	(1)
4- 1	D4 - 2502	Synchro contact lever	94	316	1
2	D4 - 2503	Synchro contact A	95	317	2
3	D4 - 2504	Insulator A	96	561	3
4	D4 - 2505	Insulator B	97	562	1
5	D4 - 2506	Insulator C	98	563	2
6	Z4 - 2212	Screw	99	564	2
7	D4 - 2507	Crown (Toothed wheel) E	100	565	1
8	D4 - 2508	Crown (Toothed wheel) F	101	566	1
9	D4 - 2522	Contact spring	102	318	2
10	D4 - 2509	Collar	103	567*	1
11	Z4 - 6304	Steel ball 2φ	104	568	1
12	D4 - 2511	Insulator D	105	569	2
13	D4 - 2512	Synchro contact B	106	319	1
14	D4 - 2513	Synchro contact C	107	320	1
15	D4 - 2515	Flash lead wire	108	570	1
16	D4 - 2516	Flash lead wire	109	571	2
17	D4 - 2517	Insulation tube	110	572*	2
18	D4 - 2519	Fixing washer	111	573*	2
19	D4 - 2520	Synchro cord spring	112	574*	1
20	D4 - 2521	Synchro cord screw	113	575*	1
21	DA4- 2446	Synchro socket assembly	114	522.11.233	(1)
23	D4 - 2221	Screw	115	576	2
24		Flash plug	116	410	2
25		Screw	117	162.81.057	2
26		Synchro lead adaptor	118	522.11.005	1
5- 2	Q4 - 2033	Lock nut	119	321	1
6- 1*	Z4 - 3348	Collar	120	577	2

PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
6 - 2*	DA4-2353	Guide rail assembly	121	521.31.218	(1)
3*	Z4 - 2477	Screw	122	578	2
4*	DA4-2391	Retainer assembly	123	219	1
5*	Z4 - 2511	Screw	124	579	2
6*	DA4-2356	Gear assembly	125	220	(1)
7*	Z4 - 2478	Screw	126	580	1
8*	D4 - 2359	Sliding carriage	127	322	1
9*	D4 - 2360	Slide plate	128	581	1
10*	DA4-2361	Joint assembly	129	221	(1)
11*	D4 - 2380	Click	130	582	1
12*	D4 - 2381	Click spring	131	583	1
13*	DA4-2366	Scale housing A assembly	132	222	(1)
14*	Z4 - 2480	Screw	133	584	2
15*	D4 - 2371	Worm shaft	134	585	1
16*	D4 - 2373	Drum	135	586	1
17*	Z4 - 2483	Screw	136	587	2
18*	D4 - 2372	Worm gear element	137	323	1
19*	DA4-2374	Pointer assembly	138	223	(1)
20*	D4 - 2369	Window	139	324	1
21*	D4 - 2368	Scale housing B	140	325	1
22*	Z4 - 2481	Screw	141	164.31.867	3
23*	D4 - 2386	Clip ring	142	533.21.393	2
24*	D4 - 2379	Handle	143	521.31.590	1
25*	DA4-2384	Scale profile assembly	144	224	(1)
26*	DA4-2364	Driving ring assembly	145	225	(1)
27*	Z4 - 1162	Washer	146	591	1
28*	D4 - 2112	Red point	147	592	1
29	D4 - 2465	Spring	148	593	1
30	D4 - 2209	Bolt	149	594	1
31	D4 - 2383	Bolt	150	595	1
32	DA4-2421	Toothed wheel	151	521.31.226	1
33	DA4-2423	Toothed wheel	152	521.31.227	1
34	DA4-2425	Toothed wheel	153	521.31.228	1
35	DA4-2427	Toothed wheel	154	521.31.229	1
36	DA4-2457	Turning plate assembly	155	521.31.230	
		Washer	156	166.30.089	

**Note:**

Parts marked \* are for the use of 521.31 only, excepting slow speed governor 3-1 which can be used for 521.11 (or X1200), too. Other parts can be universally used for both 521.31 and 521.11 (or X1200).

## INSTRUCTIONS FOR REPAIRS

### (A) Cleaning of Shutter

All parts of the shutter can be disassembled and cleaned down to the part indicated in the disassembling diagram. However, soldered and glued parts should not be disassembled unless necessary.

#### (a) Metal Parts

- (1) Metal parts or metal plated parts are soaked in clean trichloroethylene or perchloroethylene liquid and cleaned.
- (2) Parts treated with a solid lubricant (shutter blade assembly **2-32**, rear cover plate assembly **1-13**) are wiped with a cloth soaked in benzine or alcohol.
- (3) The coated surface of painted parts (base plate assembly **2-1**, front cover plate assembly **1-1**) are wiped with soft, dry cloth, silicone cloth or chamois leather. Other places are wiped with cloth soaked in benzine or alcohol.
- (4) Metal parts on which synthetic resins and rubber are assembled (charge lever assembly **2-35**, main cocking lever assembly **2-64**, flash lead wire **4-15** and **4-16**, synchro socket assembly **4-21**) are wiped with a cloth soaked in benzine or alcohol. At this time, be careful not to touch the synthetic resin and rubber parts.  
[Use this method of wiping for tension ring assembly **2-57** because bushing **2-62** is pressfitted therein. However, if bushing **2-62** is to be replaced, it can be soaked in cleaning liquid as mentioned in (1)].

- #### (b) Synthetic resins and rubber parts (packing B **1-16**, stopper **2-2**, shutter blade stopper **2-53**, insulator A **4-3**, insulator B **4-4**, insulator C **4-5**, insulator D **4-12**, insulation tube **4-17**, sliding carriage **6-8**, slide plate **6-9**, scale housing A assembly **6-13**, worm gear element **6-18**, window **6-20**, scale housing B **6-21**, scale profile assembly **6-25**), are wiped with soft cloth, silicone cloth or chamois leather.

Wipe window **6-20** with cloth soaked in static electricity prevention solution for dust-proof purposes.

### (B) Oiling

Proper and accurate shutter functioning and performance can be maintained only with the use of specified lubricants. Therefore, do not use lubricants other than those specified. (Lubricants will be supplied if necessary.)

#### (a) Gear Oil (synthetic lubricant Di Octyl Sebacate)

- (1) Properly oil the gear bearing part, the anchor bearing part, the roller and other bearings of the slow governor assembly with a very small oiler.
- (2) Properly oil the tension adjustment lever assembly and click lever assembly rollers with a small brush or a very small oiler.
- (3) Properly oil the ball bearings of the tension ring assembly with a very small oiler.

#### (b) Grease (specially synthesized EB-5) \* Graphite powder

- \* (1) Apply to the sliding surfaces of the sector ring and the lens mounting tube. Be careful to apply uniformly.
- \* (2) Apply a small amount uniformly to the sliding surface of the base plate assembly which comes into contact with the sector ring.
- (3) Apply to the sliding surface of the base plate assembly which comes into contact with the charge lever assembly.
- (4) Apply to the surface of the base plate assembly on which the steel ball  $2\phi$  of the synchro contact lever slides.
- (5) Apply to all the shafts and mortises of the levers of the base plate assembly for their proper operation.
- (6) Apply to the sliding surface of the base plate assembly which comes into contact with the piston shift lever.
- (7) Apply to the contact surface where the closing lever hits the bounce stop lever.
- (8) Apply to the contact surface between the B lever and the charge lever.
- (9) Apply to the contact surface between the B shift lever and the B lever.
- (10) Apply to the engaging surface between the tension ring and the cutting pawl.
- (11) Apply to the sliding surface between the roller and the collar.
- (12) Apply to the contact surface between the piston shift lever and the stud of the tension ring.
- (13) Apply to the contact surface between the main cocking lever and the stopper.
- (14) Apply to the working surface between the ball bearings of the tension ring and the lens mounting tube.
- (15) Apply to the contact surface where the tension ring hits the slow governor.
- (16) Apply to the sliding surface between the speed change cam and the lens mounting tube.



- (17) Apply to the sliding surface between the border plate B and the steel ball  $3\phi$ .
- (18) Apply to the engaging surface between the charge lever assembly and the slow governor.
- (19) Apply to the sliding surface between charge lever assembly and the charge lever holder.
- (20) Apply to the sliding surface between the driving ring assembly and the lens mounting tube

For details other than the slow governor assembly, refer to the lubricating chart.

### (C) Binding

Refer to the detailed chart on binding.

(a) Parts to be glued with neoprene type binding agent.

- (1) Packing B **1-16**
- (2)
- (3) Shutter blade stopper **2-53** (four pieces)
- (4) Flash lead wire **4-15, 4-16** (two pieces)

(b) Parts on which Stadlock (manufactured by Loctite Corporation, U.S.A.) or similar binding agents are applied to the screws when assembling.

- (1) Screw for release roller **2-43**
- (2) Screw for lens mounting tube **2-52**
- (3) Screw for tension ring stopper **2-59**
- (4) Screw for guide rail **6-3**
- (5) Screw for retainer **6-5**
- (6) Screw for scale housing A **6-14**
- (7) Screw for drum **6-17**
- (8) Screw for scale housing B **6-22**

(c) Apply Stadlock or similar binding agents to the anchor B adjusting screw of the slow governor assembly when adjusting shutter speeds.

(d) Parts to be glued with Atlas 500 binding agent

- (1) Cushion **2-33**

### (D) Assembly and Adjustment

(a) When sector ring assembly **2-47** is assembled into base plate assembly **2-1**, together with lens mounting tube **2-51**, sector ring assembly **2-47** should be smoothly functioning within the working range without catches or creaks. Since this greatly affects the shutter speed, close attention is required as stated in (B) (b) (1) and (B) (b) (2). The assembling position of lens mounting tube **2-51** and base plate assembly **2-1** is at the wide part of the bayonet of lens mounting tube **2-51**, as shown in Fig. 1.

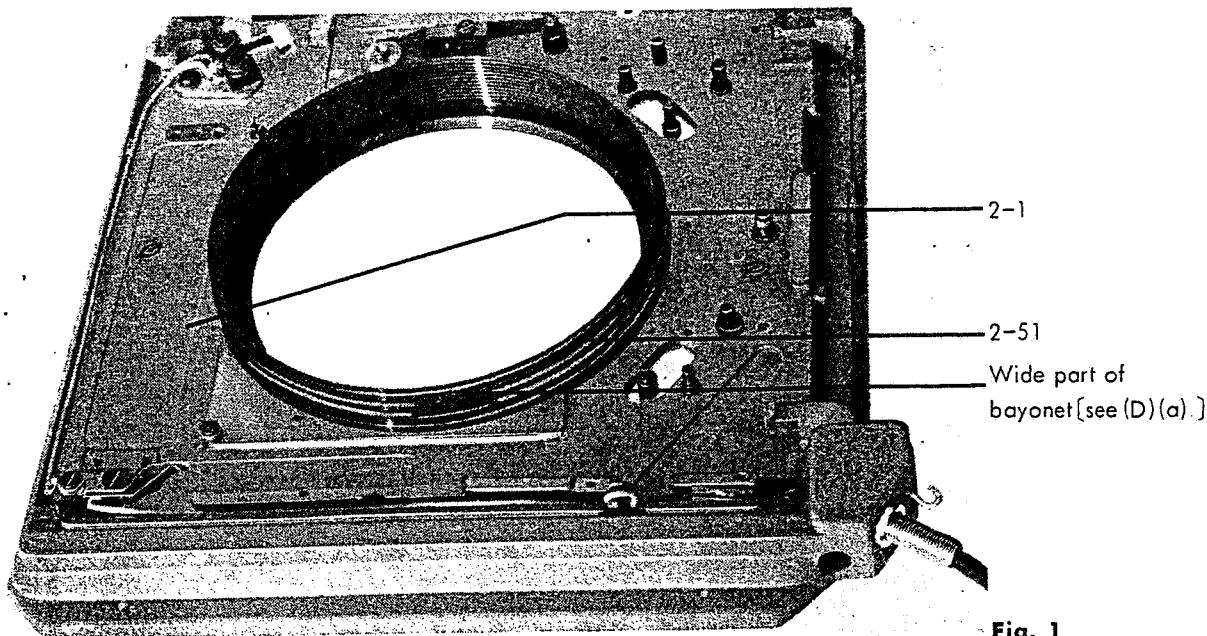


Fig. 1

- (b) After assembling sector ring assembly 2-47 and lens mounting tube 2-51 into base plate assembly 2-1, oil absolutely should not adhere to each surface on which shutter blade assembly 2-32 slides. If oil should adhere to these surfaces, wipe them off with cloth soaked in trichloroethylene or perchloroethylene.
- (c) When assembling shutter blade assembly 2-32, be careful of the direction in which the blade tip is bent and the order of assembly. Assemble it according to Fig. 2.

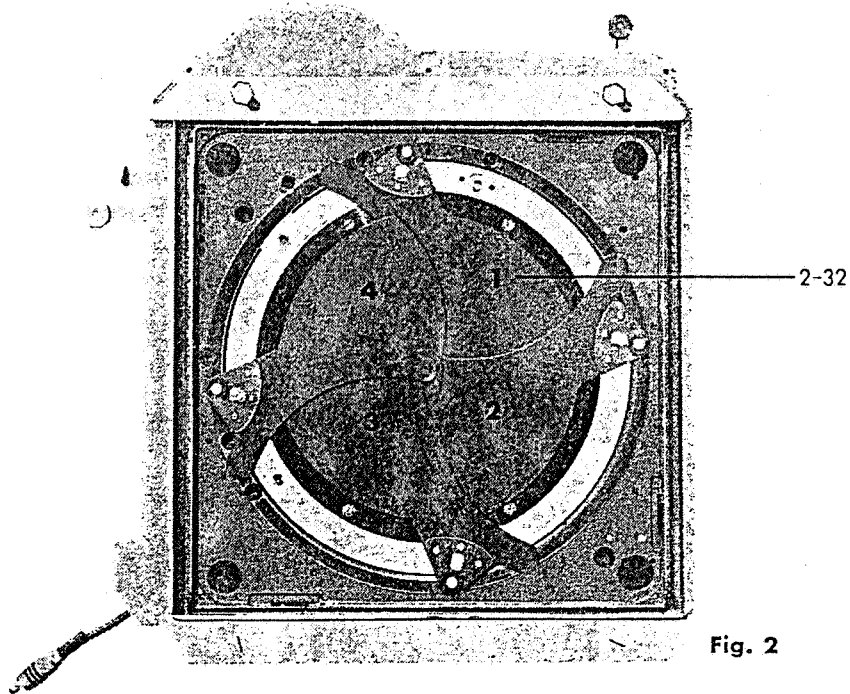


Fig. 2

- (d) To adjust synchro contact B 4-13 and synchro contact C 4-14, set the shutter speed at B. When charge lever assembly 2-35 is operated to maximum, both of the synchro contacts should come into contact accurately. When charge lever assembly 2-35 is not operated, there should be a 0.5-1 mm gap between the synchro contacts.
- (e) To adjust the contact timing for the two pieces of synchro contact A 4-2 and the contacting part of main cocking lever assembly 2-64, align the index mark of synchro contact lever 4-1 to X, set the shutter speed at B and operate charge lever assembly 2-35 for opening of shutter blades. When the blade tips open up to the range of 2.5 to 0.5 mm before full opening of 75 $\phi$  mm aperture, adjust two pieces of synchro contact A 4-2 so that those contacts may come into contact accurately as shown in Fig. 3.

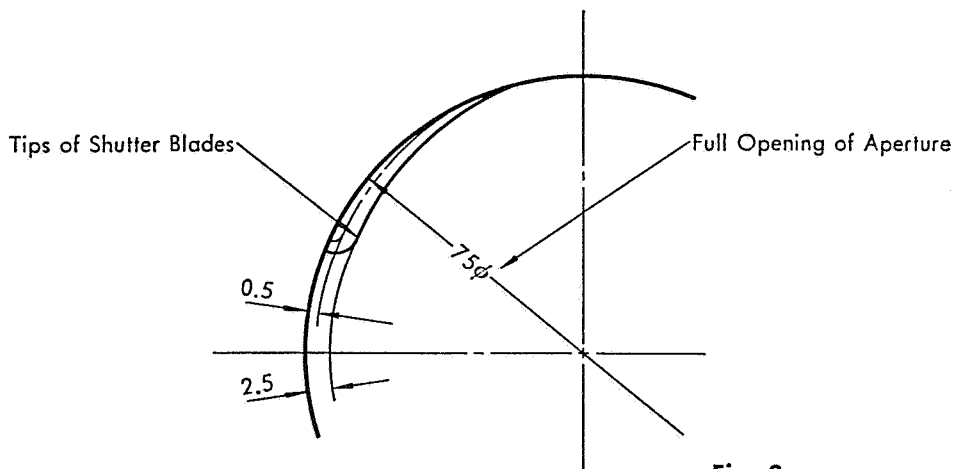
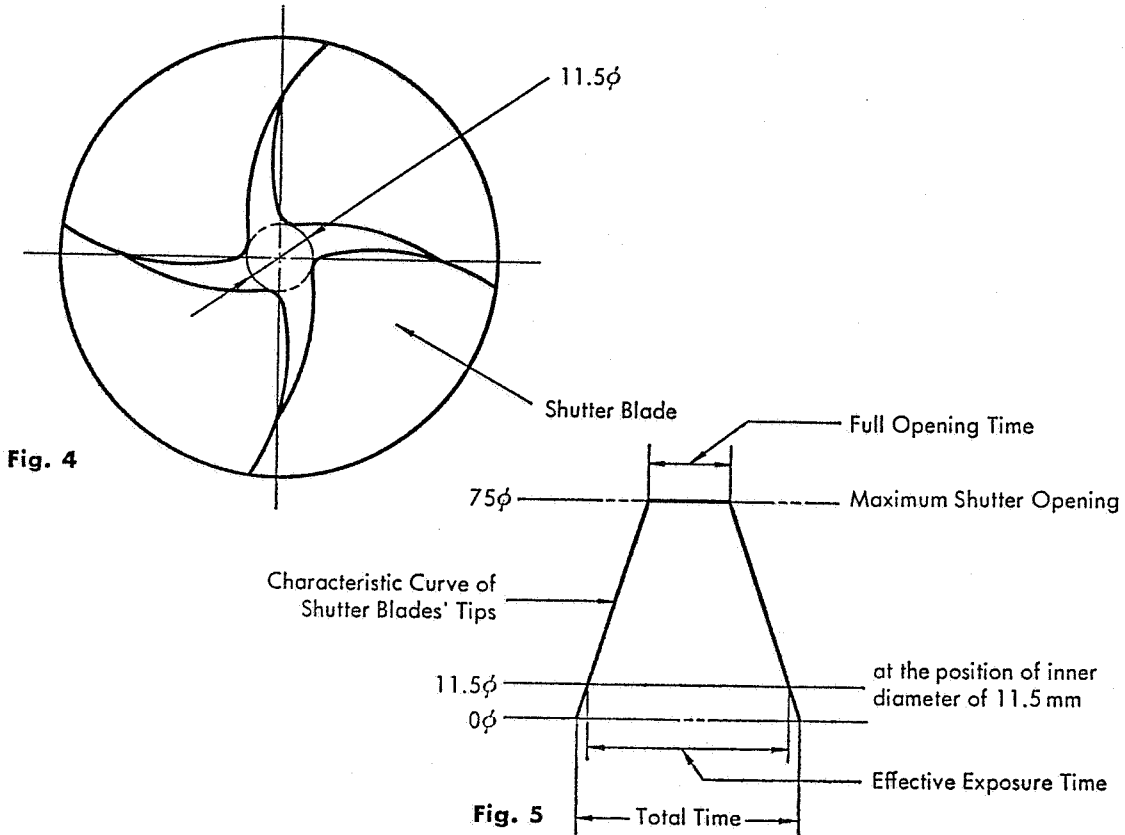


Fig. 3

- (f) Adjust Synchro contact A 4-2 (2 pieces), synchro contact B 4-13 and synchro contact C 4-14 so that the synchro contact efficiency is 70% or more at X for the contacting time of 1 mS, and 70% or more at M for the contacting time of 2.5 mS. However, be careful that it does not affect the other functions of the shutter.
- (g) Unlike ordinary lens shutters, this shutter is corrected for over-exposure at smaller apertures. Therefore, the exposure time indicates the time required from when the tips of shutter blades start to open and reach an inner diameter of 11.5 mm to when they reach 11.5 mm again before their closing. (See Fig. 4 and Fig. 5)



(1) The tolerances of exposure times are given hereunder:

SHUTTER SETTING (Sec.)	NOMINAL (mS)	UPPER LIMIT (mS)	LOWER LIMIT (mS)
1/60	15.625	20.313	10.938
1/30	31.25	40.625	21.875
1/15	62.5	75	50
1/ 8	125	150	100
1/ 4	250	300	200
1/ 2	500	550	450
1	1000	1100	900
2	2000	2200	1800
3	3000	3300	2700
4	4000	4400	3600
6	6000	6600	5400
8	8000	8800	7200

(2) Adjustment at 8 seconds is performed with the anchor adjustment B screw of slow governor assembly 3-1. After adjustment has been completed, securely glue the screw.

- (h) Driving ring assembly **6-26** should rotate smoothly without catching or creaking, within its working range, when the shutter is released.

This greatly affects the diaphragm coupling mechanism of this shutter. Therefore, special attention should be paid as stated in (B) (b) (20).

And, when assembling driving ring assembly **6-26** to lens mounting tube **2-51**, be careful of the engagement of gear assembly **6-6** with the gear of driving ring assembly **6-26**. In this case, the position of bolt for driving ring must be aligned to the red position mark of front cover plate assembly **1-1** when it is assembled, as shown in Fig. 6.

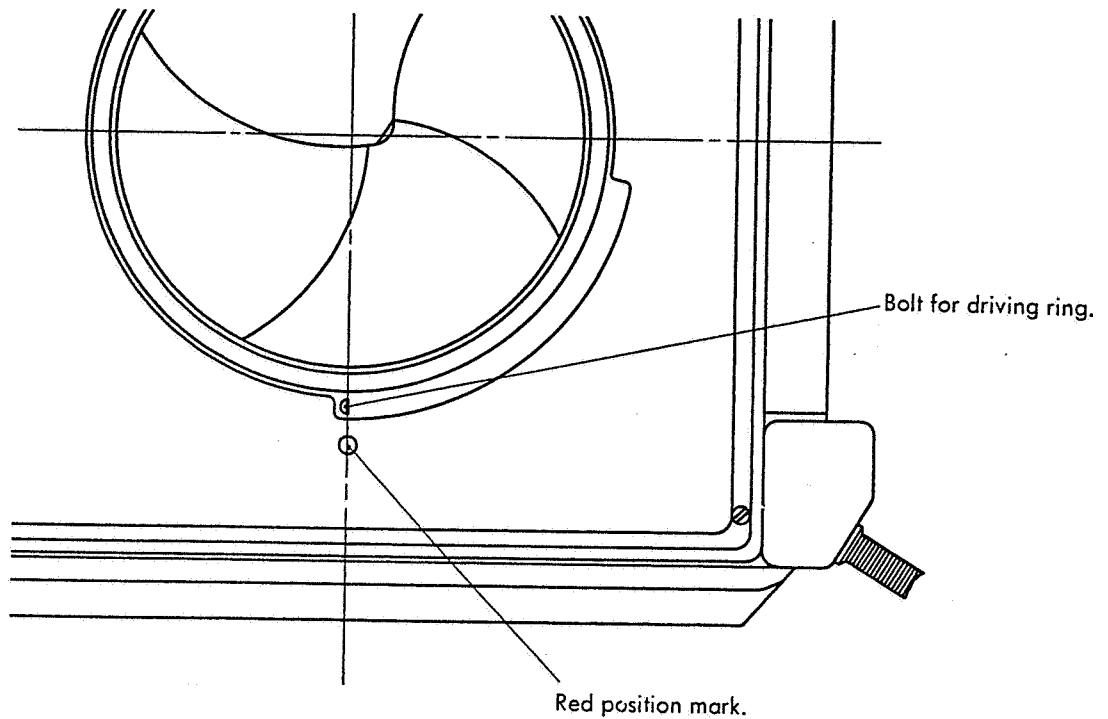



Fig. 6

- (i) To adjust the stud position of driving ring assembly **6-26** and the f stop number of pointer assembly **6-19**, loosen screw **6-17** and turn handle **6-24**. After adjustment has been completed, perform binding according to (C) (b) (7).  109.05.617

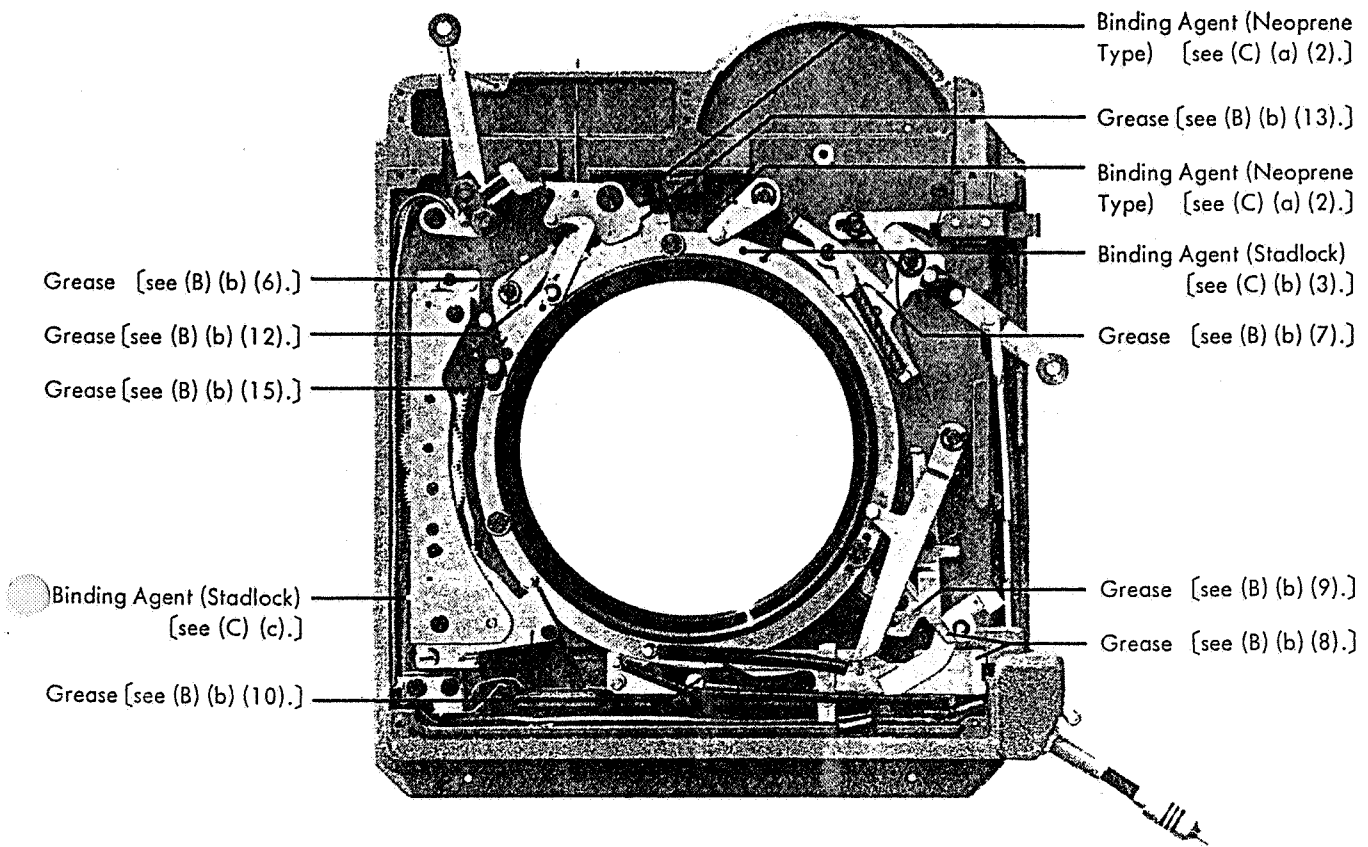
## (E) Repair Instructions

The main troubles, causes and repair methods are given in the following chart. Perform accurate repairs to all troubles.

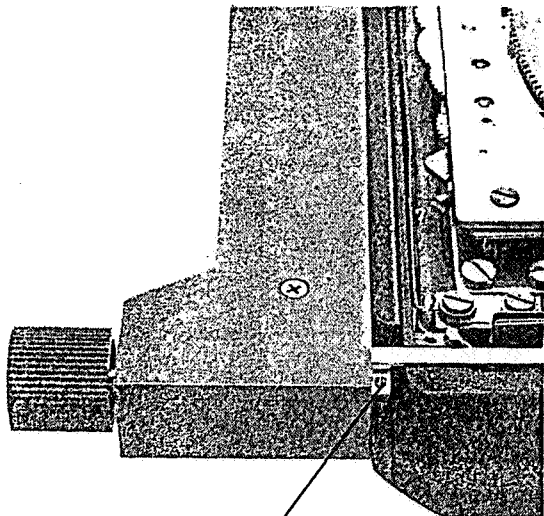
TROUBLE	CAUSE	REPAIR METHOD
Shutter cannot be released	<ol style="list-style-type: none"> <li>1) Tension ring and engaging part of hook lever are worn out.</li> <li>2) Piston or tension ring is loose or warped and the piston rotates in reverse.</li> <li>3) Charge lever spring is not engaged to spring hook.</li> <li>4) Charge lever spring is broken.</li> <li>5) Dust has adhered to the surfaces between the charge lever and base plate, or the charge lever does not return due to insufficient oil.</li> <li>6) Main spring is broken.</li> <li>7) Play of retainer.</li> <li>8) Play of guide rail.</li> <li>9) Creaking of driving ring.</li> </ol>	<ol style="list-style-type: none"> <li>1) Replace tension ring assembly <b>2-57</b> or charge lever assembly <b>2-35</b>.</li> <li>2) Replace piston assembly <b>2-60</b> or tension ring assembly <b>2-57</b>.</li> <li>3) Reengage the spring. If it is easily disengaged, repair the shape of the hook part of the spring.</li> <li>4) Replace charge lever spring <b>2-36</b>.</li> <li>5) Rinse and oil [(B) (b) (3)].</li> <li>6) Replace main spring <b>2-63</b>.</li> <li>7) Tighten screw <b>6-5</b>, oil and bind [(B) (b) (19)], [(C) (b) (5)].</li> <li>8) Tighten screw <b>6-3</b> and bind [(C) (b) (4)].</li> <li>9) Rinse and oil [(B) (b) (20)].</li> </ol>
1/60 sec. slow	<ol style="list-style-type: none"> <li>1) Grating of sector ring.</li> <li>2) Grating of tension ring when rotating.</li> </ol>	<ol style="list-style-type: none"> <li>1) Rinse and oil [(B) (b) (1)], sector ring assembly <b>2-47</b>.</li> <li>2) Rinse tension ring assembly <b>2-57</b> and oil [(B) (a) (3)] bearings, etc.</li> </ol>
Faulty speeds (excluding 1/60 sec.)	<ol style="list-style-type: none"> <li>1) Insufficient oil in bearings and other parts.</li> <li>2) Bearings of slow governor are damaged or out of adjustment due to abrasion of gears.</li> <li>3) Rivet of slow speed plate of tension ring is loose.</li> </ol>	<ol style="list-style-type: none"> <li>1) Oil [(B) (a) (1)].</li> <li>2) Replace slow governor assembly <b>3-1</b>.</li> <li>3) Replace tension ring assembly <b>2-57</b>.</li> </ol>
Shutter blades do not close at B	<ol style="list-style-type: none"> <li>1) B lever is bent where it hits the charge lever.</li> <li>2) Contact section between B lever and charge lever catches.</li> </ol>	<ol style="list-style-type: none"> <li>1) Repair the bent in B lever assembly <b>2-23</b>.</li> <li>2) Oil contact surface between B lever assembly <b>2-23</b> and charge lever assembly <b>2-35</b> [(B) (b) (8)].</li> </ol>
Malfunction of synchro contact	<ol style="list-style-type: none"> <li>1) Soldered part has come loose or line disconnection.</li> <li>2) Disconnection of flash lead wire.</li> <li>3) Foreign matter has adhered to various contacts.</li> <li>4) Loose screw on synchro plug assembly head.</li> </ol>	<ol style="list-style-type: none"> <li>1) Resolder.</li> <li>2) Replace flash lead wire <b>4-15</b>, <b>4-16</b>.</li> <li>3) Rinse each contact [(A) (a) (1)].</li> <li>4) Tighten screw of synchro socket assembly <b>4-22</b>.</li> </ol>

TROUBLE	CAUSE	REPAIR METHOD
Back of shutter blade catches on lens mounting tube	1) Big overlap of shutter blades.	1) Adjust so that main cocking lever hits faster by replacing or adding stopper <b>2-2</b> and adjustment washer <b>2-4</b> .
Stud of driving ring and f stop of pointer are out of correct position	1) Screw between drum and worm shaft is loose.	1) After adjusting angle of driving stud with angle adjuster, tighten screw <b>6-17</b> [(C) (b) (7)].
Slip torque of handle is decreased.	1) Worm shaft is worn out. 2) Worm shaft groove is crushed.	1) Widen groove of worm shaft. <b>6-15</b> 2) Widen groove of worm shaft. <b>6-15</b>
Scale profile assembly catches when inserting into scale housing.	1) Pointer has peeled off.	1) Replace scale profile assembly <b>6-25</b> .
Window is dirty.	1) Dust has infiltrated into scale housing.	1) Rinse window <b>6-20</b> [(A) (b)].

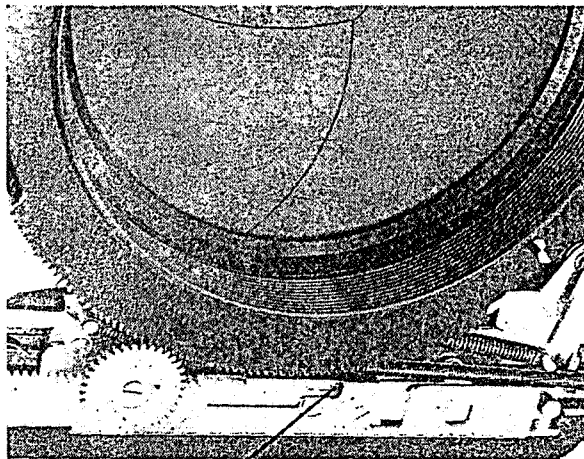






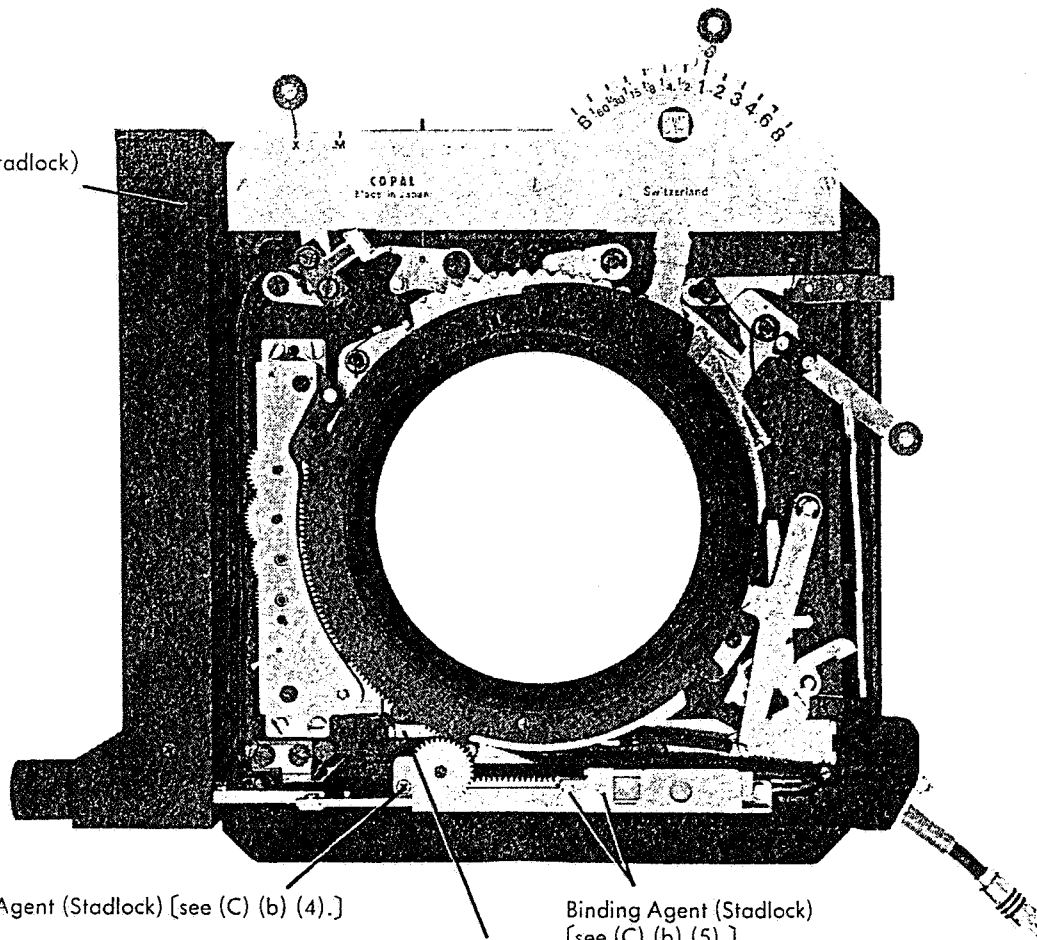


Binding Agent (Stadlock)  
[see (C) (b) (7).]



Grease [see (B) (b) (19).]

Binding Agent (stadlock)  
[see (C) (b) (8).]



Binding Agent (Stadlock) [see (C) (b) (4).]

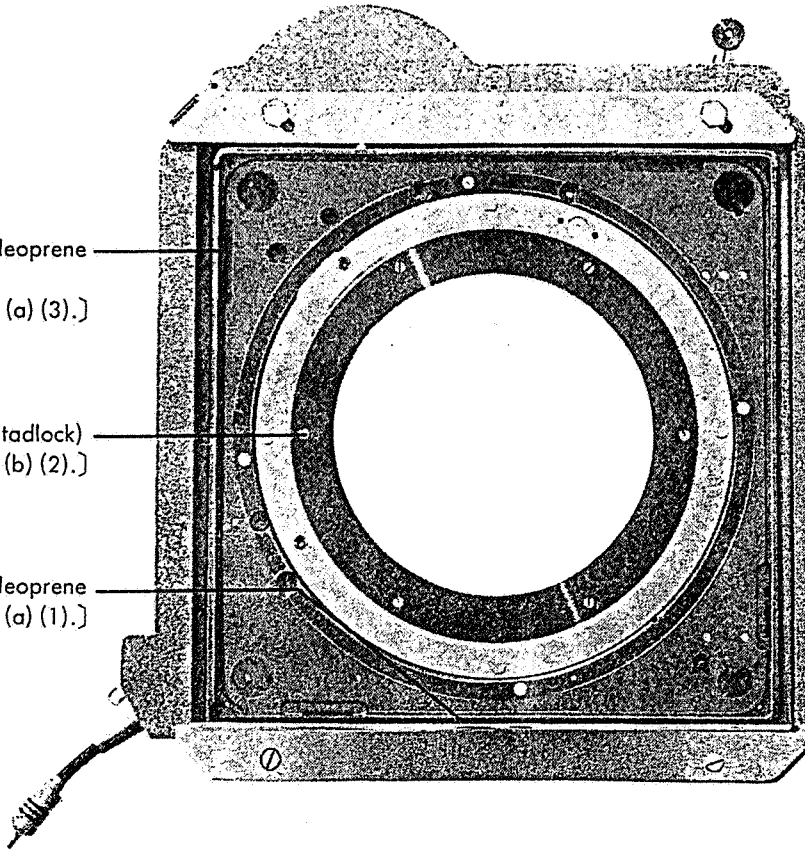
Binding Agent (Stadlock)  
[see (C) (b) (5).]

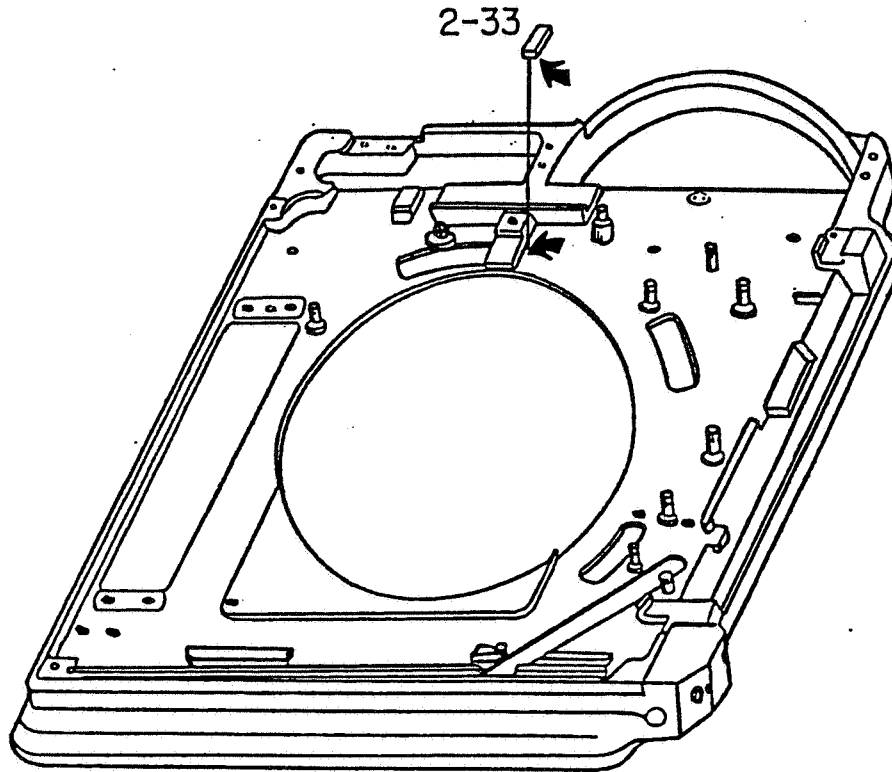
Grease  
[see (B) (b) (18).]

Binding Agent (Neoprene  
Type) 4 places  
[see (C) (a) (3).]

Binding Agent (Stadlock)  
6 places [see (C) (b) (2).]

Binding Agent (Neoprene  
Type) [see (C) (a) (1).]





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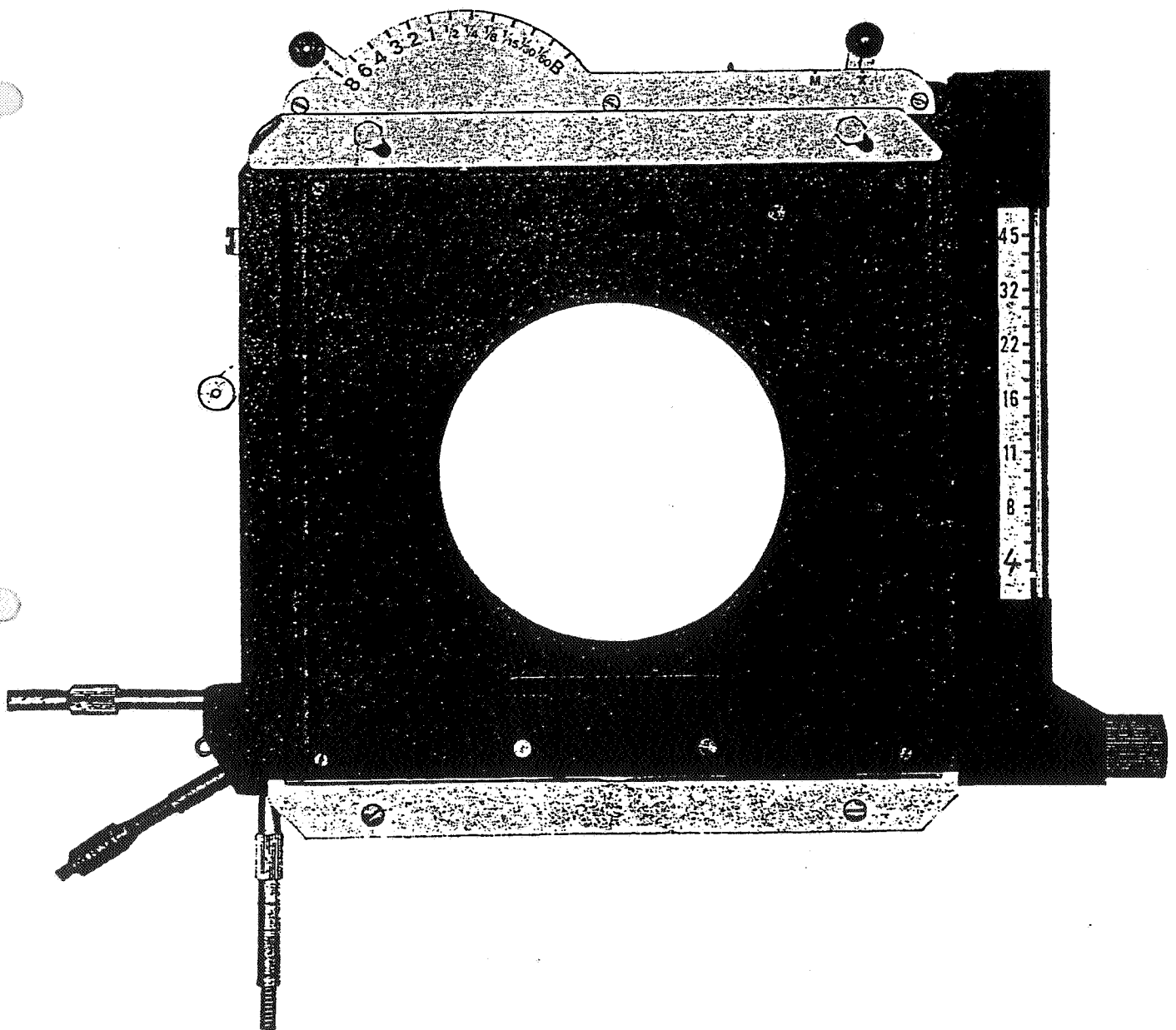
**Atlas Plastic adhesive 500**

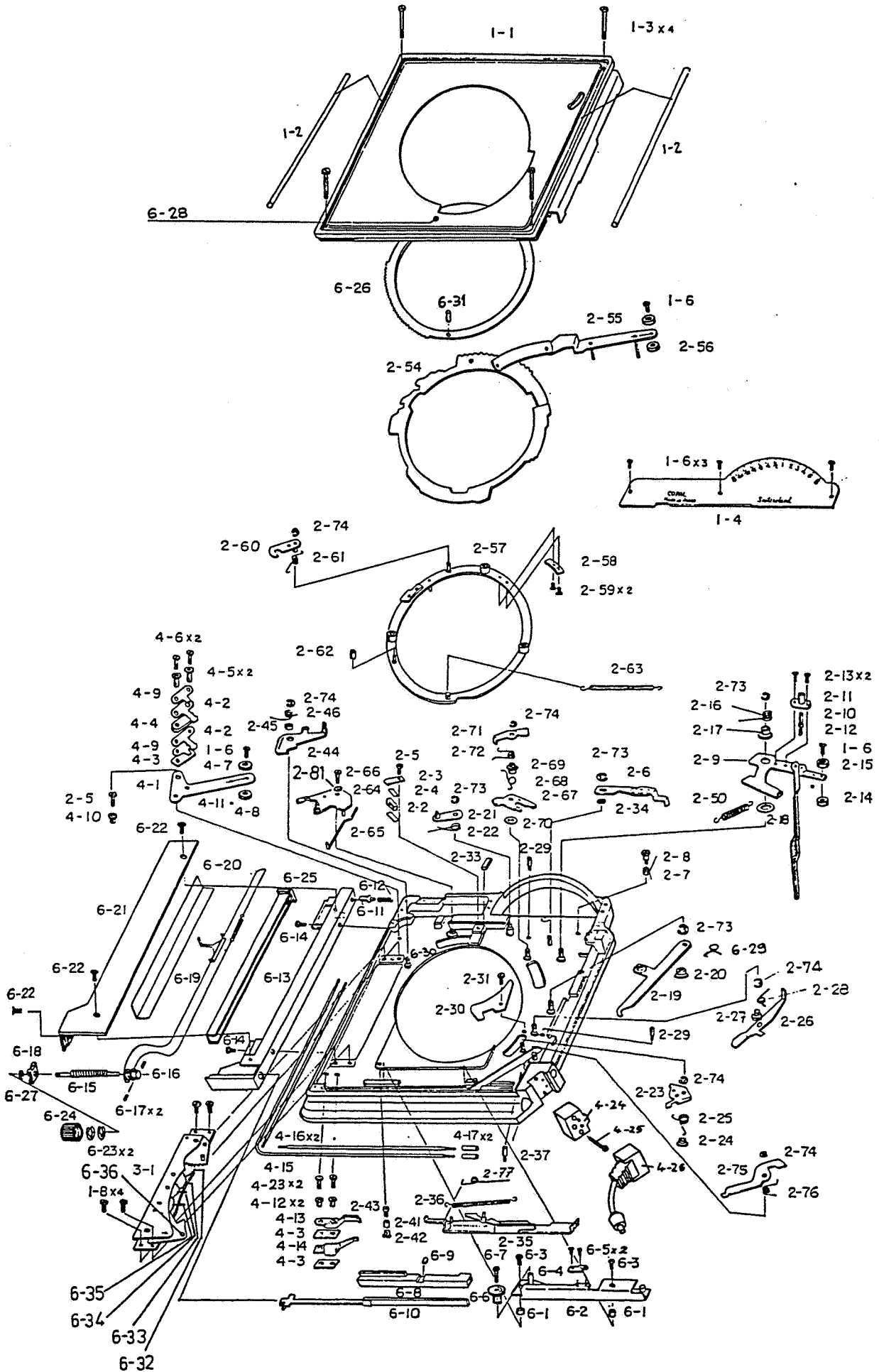
Adhesive of solvent on the basis of Nitril caoutchouc

<p><b>Characteristics</b></p>	<p>Atlas plastic adhesive 500 possesses a very good initial and end adhesion at a good surface adhesiveness. The good metal adhesion and the resistance to plasticizer is remarkable.</p>
<p><b>Fields of application</b></p>	<p>Sticking together of PVC near leather and foils against themselves and against metals, wood, hard fibre plates, paperboard, weaves, leather, glass and others</p>
<p><b>Diluent and detergent</b></p>	<p>Solvent C</p>
<p><b>Storing</b></p>	<p>At least 6 months at a temperature of 20°C TO 25°C</p>
<p><b>Important hint</b></p>	<p>At temperatures below 15°C the adhesive can thicken, however, contains after warming up to the normal processing temperature its good greasing respectively processing capacities.</p>
<p><b>Recommendations of processing</b></p>	
<p>a) Pre-treatment of the adherents</p>	<p>Before putting on the adhesive all adherends are to be cleaned carefully from impurities decrease and roughen both sides.</p>
<p>b) Application of adhesive</p>	<p>At normal viscosity both parts which have to be stucked together are greased with Atlas plastic adhesive 500 in constant thickness.</p>
<p>c) Time of outgoing air d) Open time</p>	<p>After a time of outgoing air of approx. 5 min. the sticking together can be made. Approx. 15 min. at a room temperature of 20°C. Should the open time be exceeded, surfaces which are greased with an adhesive can be reactivated after greasing by means of hot air or ultra red radiation.</p>
<p>e) Sticking together</p>	<p>Press strongly together by hand, it is better to beat or to press.</p>
<p><b>Poison class:</b></p>	<p>Gld. 3 - EGA No. 54164 Observe warning on pack</p>

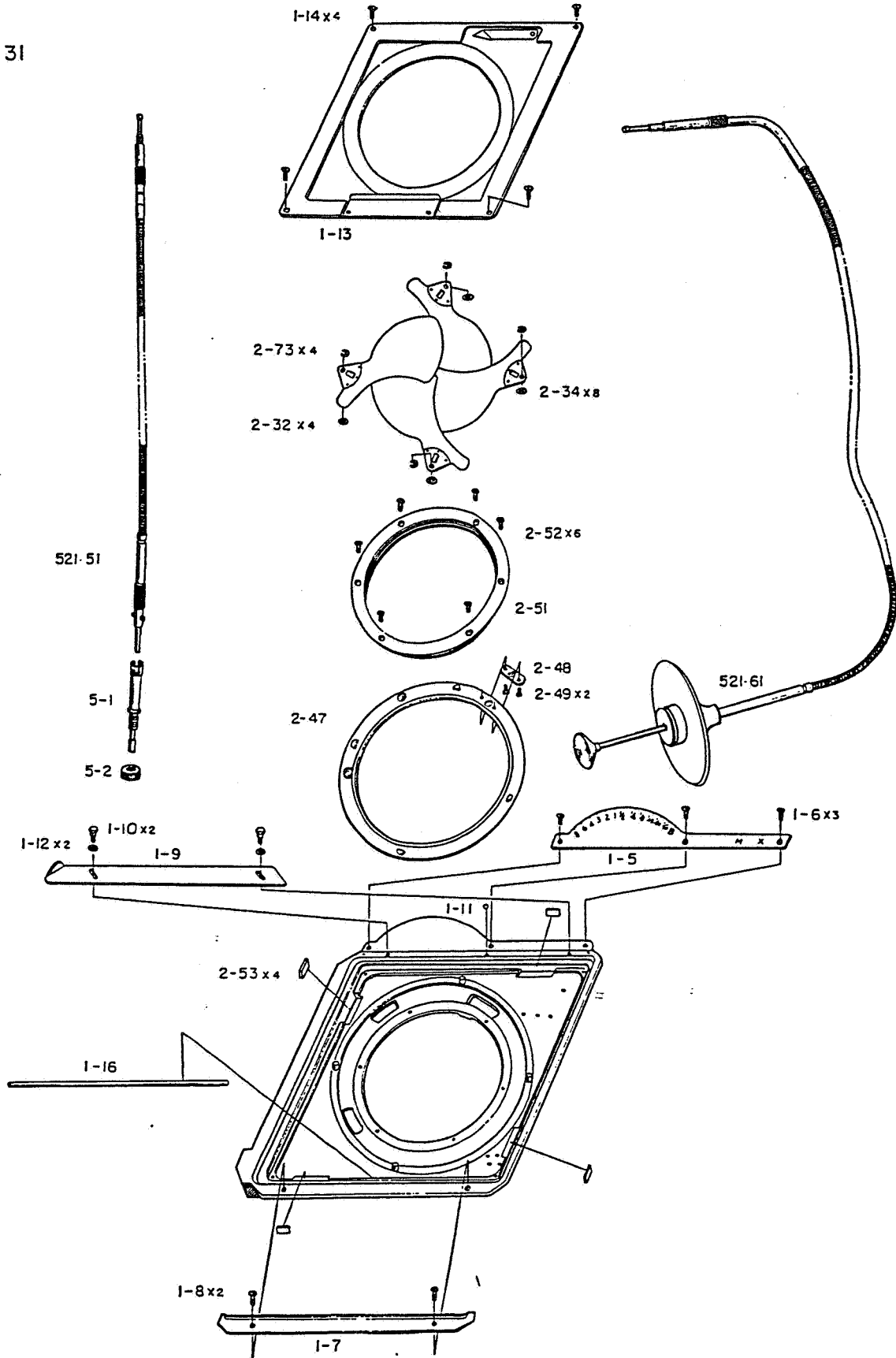


# SINAR Fully Automatic Shutter 521.31





521-31



PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
1 - 1*	DA4-2132	Front cover plate assembly	1	521.31.235	(1)
2	D4 - 2108	Packing A	2	500	2
3*	Z4 - 2282	Screw	3	501	4
4	D3 - 212	Speed graduation plate A	4	300	1
5	D4 - 2133	Speed graduation plate B	5	329	1
6	Z4 - 2202	Screw (1-17*)	6	502	9
7	D4 - 2102	Border plate A	7	302	1
8	Z4 - 2203	Screw	8	503	6
9	D4 - 2103	Border plate B (1-18*)	9	303	1
10	D4 - 2104	Border plate B screw	10	504	2
11	Z4 - 1451	Steel ball 3φ	11	505	1
12	Z4 - 3217	Washer	12	506	2
13	DA4- 2105	Rear cover plate assembly	13	201	(1)
14	Z4 - 2204	Screw	14	507	4
16	D4 - 2334	Packing B	16	509	1
17*	Z4 - 1205	Screw black	17	510	9
18*	D4 - 2118	Border plate B	18	304	(1)
2 - 2	D4 - 2211	Stopper	19	305	1
3	D4 - 2212	Holder	20	306	1
4	D4 - 2292	Adjustment washer	21	511	1
5	Z4 - 2205	Screw	22	512	2
6	DA4- 2213	Slide bar sub assembly	23	202	(1)
7	D4 - 2216	Slide bar spring	24	513	1
8	D4 - 2217	Screw	25	514	1
9*	DA4- 2338	Closing lever assembly	26	203	(1)
10*	D4 - 2340	Translation pin	27	515	1
11	D4 - 2224	Translation collar	28	516	1
12	D4 - 2225	Translation pin spring	29	517	1
13	Z4 - 2791	Screw	30	518	2
14	D4 - 2227	Crown (Toothed wheel) A	31	519	1
15	D4 - 2228	Crown (Toothed wheel) B	32	520	1
16	D4 - 2229	Closing lever spring	33	521	1
17	D4 - 2230	Collar	34	522	1
18	Z4 - 3201	Washer	35	523	1
19*	DA4- 2341	Tension adjustment lever assembly	36	204	(1)
20	D4 - 2235	Collar	37	524	1
21	DA4- 2236	Click lever assembly	38	205	(1)
22	D4 - 2238	Click spring	39	525	1
23	DA4- 2243	B lever assembly	40	206	(1)
24	D4 - 2245	Collar	41	526	1
25	D4 - 2246	Spring	42	527	1
26	D4 - 2240	B shift lever	43	307	1
27	D4 - 2241	Collar	44	528	1
28	D4 - 2242	Spring (6-29)	45	529	1
29	D4 - 2247	Screw	46	530	2
30	D4 - 2248	Sector ring stopper	47	308	1
31	D4 - 2249	Screw	48	531	1
32	DA4- 2255	Shutter blade assembly	49	207	(4)
33	D4 - 2256	Cushion	50	532	1
34	Z4 - 1275	Washer	51	533	9
35*	DA4- 2344	Charge lever assembly	52	208	(1)
36*	D4 - 2382	Charge lever spring	53	534	1
37*	D4 - 2348	Screw	54	535	1
41	D4 - 2268	Roller	55	536	1
42	D4 - 2269	Collar	56	537	1
43	D4 - 2270	Screw (for release roller)	57	538	1
44	D4 - 2271	Piston shift lever	58	309	1
45	D4 - 2272	Collar	59	539	1
46	D4 - 2273	Spring	60	540	1
47	DA4- 2274	Sector ring assembly	61	209	(1)



PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
2 - 48	D4 - 2279	Guidance collar	62	521.31.311	1
49	Z4 - 2206	Screw	63	541	2
50	D4 - 2280	Sector ring spring	64	542	1
51*	D2 - 230	Lens mounting tube	65	543	1
52	Z4 - 1392	Screw (for lens mounting tube)	66	544	6
53	D4 - 2281	Shutter blade stopper	67	545	4
54*	DA3- 222	Speed change cam assembly	68	210	(1)
55	D4 - 2290	Crown (Toothed wheel) C	69	546	1
56	D4 - 2291	Crown (Toothed wheel) D	70	547	1
57	DA3- 231	Tension ring assembly	71	211	(1)
58	D4 - 2310	Tension ring stopper	72	312	1
59	Z4 - 2207	Screw (for tension ring stopper)	73	548	2
60	DA4- 2330	Piston assembly (2-80)	74	212	(1)
61	D4 - 2308	Spring	75	549	1
62	D4 - 2311	Bushing	76	550	1
63	D4 - 2312	Main spring	77	551	1
64	DA4-4241	Main cocking lever assembly	78	213	(1)
65	D4 - 2319	Signal rod	79	552	1
66	Z4 - 2208	Screw	80	553	1
67	DA4- 2326	Bounce stop lever assembly	81	214	(1)
68	D4 - 2321	Bounce stop lever spring	82	554	1
69	D4 - 2322	Collar	83	555	1
70	Z4 - 3203	Washer	84	556	1
71	D4 - 2323	Shift lever	85	313	1
72	D4 - 2324	Shift lever spring	86	557	1
73	D4 - 1402	Snap ring	87	314	8
74	Z4 - 1403	Snap ring	88	558	6
75*	D4 - 2351	Lock lever	89	315	1
76*	D4 - 2352	Lock lever spring	90	559	1
77	D4 - 2390	Spring	91	560	1
80*	DA4-2397	Piston assembly	92	215	1
3 - 1*	DA4- 2455	Slow governor assembly	93	216	(1)
4 - 1	D4 - 2502	Synchro contact lever	94	316	1
2	D4 - 2503	Synchro contact A	95	317	2
3	D4 - 2504	Insulator A	96	561	3
4	D4 - 2505	Insulator B	97	562	1
5	D4 - 2506	Insulator C	98	563	2
6	Z4 - 2212	Screw	99	564	2
7	D4 - 2507	Crown (Toothed wheel) E	100	565	1
8	D4 - 2508	Crown (Toothed wheel) F	101	566	1
9	D4 - 2522	Contact spring	102	318	2
10	D4 - 2509	Collar	103	567	1
11	Z4 - 6304	Steel ball 2φ	104	568	1
12	D4 - 2511	Insulator D	105	569	2
13	D4 - 2512	Synchro contact B	106	319	1
14	D4 - 2513	Synchro contact C	107	320	1
15	D4 - 2515	Flash lead wire	108	570	1
16	D4 - 2516	Flash lead wire	109	571	2
17	D4 - 2517	Insulation tube	110	572	2
			111		
			112		
			113		
			114		
23	D4 - 2221	Screw	115	576	2
24		Flash plug	116	410	1
25		Screw	117	162.81.057	2
26		Synchro lead adaptor	118	522.11.005	1
5 - 2	Q4 - 2033	Lock nut	119	321	1
6 - 1*	Z4 - 3348	Collar	120	577	2

PART No.	DRAWING No.	PART NAME	Pos.	SINAR No.	QUAN.
6 - 2*	DA4-2124	Guide rail assembly	121	521.31.231	(1)
3*	Z4 - 2477	Screw	122	578	2
4*	DA4-2391	Retainer assembly	123	219	1
5*	Z4 - 2511	Screw	124	579	2
6*	DA4-2126	Drive gear assembly	125	232	(1)
7*	Z4 - 2478	Screw	126	580	1
8*	D4 - 2359	Sliding carriage	127	322	1
9*	D4 - 2360	Slide plate	128	581	1
10*	DA4-2361	Joint assembly	129	221	(1)
11*	D4 - 2380	Click	130	582	1
12*	D4 - 2381	Click spring	131	583	1
13*	DA4-2366	Scale housing A assembly	132	222	(1)
14*	Z4 - 2480	Screw	133	584	2
15*	D4 - 2371	Worm shaft	134	585	1
16*	D4 - 2373	Drum	135	586	1
17*	Z4 - 2483	Screw	136	587	2
18*	D4 - 2372	Worm gear element	137	323	1
19*	DA4-2374	Pointer assembly	138	223	(1)
20*	D4 - 2369	Window	139	324	1
21*	D4 - 2368	Scale housing B	140	325	1
22*	Z4 - 2481	Screw	141	164.31.867	3
23*	D4 - 2386	Clip ring	142	533.21.393	2
24*	D4 - 2379	Handle	143	521.31.590	1
25*	DA4-2130	Scale profile assembly	144	234	(1)
26*	DA4-2128	Driving ring assembly	145	233	(1)
27*	Z4 - 1162	Washer	146	591	1
28*	D4 - 2112	Red point	147	592	1
29	D4 - 2465	Spring	148	593	1
30	D4 - 2209	Bolt	149	594	1
31	D4 - 2383	Bolt	150	595	1
32 *	DA4-2421	Toothed wheel	151	521.31.226	1
33 *	DA4-2423	Toothed wheel	152	521.31.227	1
34 *	DA4-2425	Toothed wheel	153	521.31.228	1
35 *	DA4-2427	Toothed wheel	154	521.31.229	1
36 *	DA4-2457	Turning plate assembly	155	521.31.230	
2-81		U-Scheibe	156	166.30.089	

**Note:**

Parts marked \* are for the use of 521.31 only, excepting slow speed governor 3-1 which can be used for 521.11 (or X1200), too. Other parts can be universally used for both 521.31 and 521.11 (or X1200).

DB (mit DB bezeichnete Abschnitte betreffen nur den Blenden-Automatverschluss 521.31).

(A) Reinigung

Der Verschluss kann in die Einzelteile gem. Montagezeichnung zerlegt werden. Leim- und Lötstellen sollten nach Möglichkeit nicht gelöst werden. (Achtung: Die Schraube 2-40 ist linksdrehend)

(a) Metallteile

- (1) Metallteile oder metall-legierte Teile werden in sauberes Trichlorethylen oder Perchlorethylen gelegt und gereinigt.
- (2) Mit festem Schmiermittel behandelte Teile (shutter blade assembly 3-32, rear cover plate assembly 1-13) werden mit einem mit Reinigungsbenzin oder Alkohol getränktem Gewebe abgerieben.
- (3) Die farblackierten Teile (base plate assembly 2-1) werden mit einem trockenen Gewebe, Silikon oder Leder abgerieben, die anderen Stellen mit Reinigungsbenzin oder alkoholgetränktem Gewebe.
- (4) Metallteile, welche mit Kunstharz und Gummiteilen verbunden sind, (charge lever assembly 2-35, main cocking lever assembly 2-64, flash lead wire 4-15 and 4-16, synchro plug assembly 4-21), werden mit einem mit Reinigungsbenzin oder Alkohol durchtränktem Gewebe abgerieben, wobei ein Berühren mit Kunstharz- oder Gummiteilen vorsichtig zu vermeiden ist. (Diese Methode ist auch für tension ring assembly 2-57 anzuwenden, weil bushing 2-62 in diesen Teil hineingepresst ist. Muss hingegen bushing 2-62 ersetzt werden, so kann der übrige Teil ins Reinigungsmittel gelegt werden, gemäss Punkt 1.)

- (b) Kunstharz- und Gummiteile (front cover plate 1-1 usw. alle gemäss Anleitung 521.31!) werden mit weichem, trockenen Gewebe, Silikon oder Leder abgerieben.

DB Um das Fenster staubfrei zu halten, window 6-20 mit Lappen und antistatischer Flüssigkeit abreiben.

(B) Schmier

Das einwandfreie und präzise Arbeiten des Verschlusses kann nur durch die Anwendung der vorgeschriebenen Schmiermittel aufrecht erhalten werden. Bitte also keine anderen Schmiermittel verwenden! Die richtigen Schmiermittel sind durch SINAR erhältlich.

(a) Getriebeöl (synthetisch, Di Oktyl Sebrakat)

- (1) Mit einem sehr feinen Oeler das Getriebelager, das Ankerlager, die Walze und die übrigen Lager des Hemmwerkes richtig ölen.
- (2) Mit einem sehr feinen Pinsel oder Oeler die Spannregulierungsvorrichtung und die Walzen der Klinkvorrichtung richtig ölen.
- (3) Mit einem sehr kleinen Oeler das Kugellager der Spannringvorrichtung richtig ölen.

## (b) Folgende Teile sorgfältig einfetten:

- (1) Die Reibflächen des Sektorenrings und des Tubusses zum Objektiv.  
Fett regelmässig auftragen!
- (2) Die Gleitflächen der Grundplatte, welche den Sektorenring berühren.
- (3) Die Gleitflächen der Grundplatte, welche die Spannvorrichtung berühren.
- (4) Die Fläche der Grundplatte, auf welcher die Stahlkugel 2  $\emptyset$  des Synchronkontakthebels gleitet.
- (5) Alle Lager und Wellen der Hebel an der Grundplatte.
- (6) Die Gleitfläche der Grundplatte, welche den Kolbenschalthebel berührt.
- (7) Die Stelle, an welcher der Schliesshebel auf den Stopper aufschlägt.
- (8) Die Kontaktfläche von B-Hebel und Ladehebel.
- (10) Die Klinkstelle von Spannring und Sperrhaken.
- (11) Die Gleitfläche von Walze und Manschette.
- (12) Die Berührungsfläche von Kolbenhebel und dem Arm des Spannringes.
- (13) Die Berührungsfläche des Hauptspannhebels und des Stoppers.
- (14) Die Arbeitsfläche zwischen den Kugellagern des Spannringes und des Tubusses zum Objektiv.
- (15) Die Stelle, an welcher der Spannring die Hemmung berührt.
- (16) Die Gleitfläche von Zeitreglernocken und Tubus zum Objektiv.
- (17) Die Gleitfläche von Abgrenzplatte B und der Stahlkugel 3  $\emptyset$
- DB (18) Die Kontaktflächen von Spannvorrichtung und Hemmwerk
- DB (19) Die Gleitflächen von Spannvorrichtung und deren Halterung
- DB (20) Die Gleitflächen von Steuerring und Objektivtubus

Für Stellen ausserhalb des Hemmwerkes, siehe Illustrationen zur Schmierung.

(C) Verkleben

Siehe Illustrationen

- (a) Mit Bindemittel vom Typ Neopren zu verkleben:  
(siehe Anleitung)
- (b) Folgende Schrauben sind bei der Montage mit Bindemittel vom Typ Stadlock (Hersteller Loctite Corp. USA) zu versehen:
- (c) Nach dem Justieren der Verschlusszeiten ist die Verstellerschraube des Ankers B von dem Hemmwerk mit Stadlock oder einem ähnlichen Bindemittel zu versehen.

(D) Montage und Justieren

- (a) Wenn das sector assembly 2-47 mit dem lens mounting tube 2-51 in dem base plate assembly 2-1 montiert ist, muss das sector ring assembly 2-47 leichtgängig in seinem Arbeitsbereich spielen, ohne jegliche Hemmung.

Dieser Faktor hat einen direkten Einfluss auf die Verschlusszeiten, daher soll den Punkten (B) (b) (1) und (B) (b) (2) besondere Beachtung geschenkt werden.

Die Position zur Montage von lens mounting tube 2-51 auf base plate assembly 2-1 ist durch den langen Ausschnitt des Bajonettverschlusses gegeben, gemäss Fig. 1.

Fig. 1: langer Ausschnitt des Bajonettverschlusses, siehe D,a

- (b) Nach dem Zusammenbau von sector ring assembly 2-47 und lens mounting tube 2-51 mit base plate assembly 2-1, sollte unter keinen Umständen Öl an eine Fläche gelangen, auf welcher shutter blade assembly 2-32 gleitet. Sollte sich dort trotzdem Öl befinden, so ist es mit einem getränkten Gewebe abzureiben.
- (c) Beim Zusammenbau von shutter blade assembly 2-32 ist darauf zu achten, dass die leicht gebogenen Spitzen der Lamellen auf die richtige Seite zu liegen kommen und dass die Lamellen in der richtigen Reihenfolge eingesetzt werden. Siehe Fig. 2.
- (d) Um synchro contact B 4-13 und synchro contact C 4-14 zu justieren, bitte die Verschlusszeit auf B einstellen.
- Wenn charge lever assembly 2-35 bis zum Anschlag durchgedrückt ist, so müssen sich die beiden synchro contacts zum einwandfreien Kontakt berühren. Ist charge lever assembly 2-35 frei in Ausgangsposition, so muss zwischen den beiden synchro contacts ein Abstand von 0,5 bis 1 mm bestehen.
- (e) Um den Zeitkontakt beider Teile des synchro contacts A 4-2 und das Kontaktstück von main cocking lever assembly 2-64 zu justieren, bitte synchro contact lever 4-1 auf X und die Verschlussgeschwindigkeit auf B einstellen. Charge lever assembly 2-35 bedienen, sodass sich der Verschluss öffnet. Wenn die Lamellenspitzen um 2,5-0,5 mm vor der vollen Öffnung von 75 mm Durchmesser stehen, werden die beiden Teile von synchro contact A4-2 so justiert, dass sie Kontakt geben. Siehe Fig. 3

Fig. 3:

Lamellenspitzen

volle Verschlussöffnung

- (f) Synchro contact A 4-2 (2 Teile), synchro contact B 4-13 und synchro contact C 4-14 sind so zu justieren, dass eine Kontaktgabe von 1 mS bei X, oder eine Kontaktgabe von 2,5 mS bei M, jeweils einen Nutzkontakt von mindestens 70 % ergibt.

(g) Im Gegensatz zu gewöhnlichen Verschlüssen ist der SINAR/COPAL Verschluss so konstruiert, dass er Ueberbelichtung bei kleinen Blendenöffnungen ausschliesst. Die angegebene Belichtungszeit entspricht der Zeitspanne, während welcher sich der Verschluss von der Oeffnung von 11,5 mm Durchmesser an den Lamellenspitzen gemessen vollständig öffnet und wieder auf den selben Durchmesser von 11,5 mm schliesst (siehe Fig. 4 und Fig. 5)

Fig. 4: Verschlusslamellen

Fig. 5: Im Uhrzeigersinn, von rechts oben:

- Zeitspanne der vollen Oeffnung
- Volle Verschlussöffnung
- Lamellenspitzen auf Kreis 11,5 mm Durchmesser
- Belichtungszeit
- Totalzeit
- Charakteristikkurve der Lamellenspitzen

(1) Die folgende Tabelle zeigt die Toleranzen der Belichtungszeiten:

Belichtungszeit	Nominalwert	Höchstwert	Tiefstwert
-----------------	-------------	------------	------------

(Werte siehe Anleitung)

(2) Die Justierung bei 8 Sek. wird mit der Anker-Justierschraube B von slow governor assembly 3-1 durchgeführt. Nach Justierung muss die Schraube mit Leim gesichert werden.

DB (h) Wenn der Verschluss ausgelöst wird, muss driving ring assembly 6-26 in seinem Arbeitsbereich ohne jede Hemmung spielen. Dies ist von starkem Einfluss auf den Blenden-Kupplungsmechanismus. Daher soll Abschnitt (B) (b) (20) besonders beachtet werden. Wenn driving ring assembly 6-26 und lens mounting tube 2-51 zusammengebaut werden, ist sorgfältig darauf zu achten, dass gear assembly 6-6 und das Getriebe von driving ring assembly 6-26 ineinander greifen. Der Uebertragungshebel (bolt for driving ring) muss beim Zusammenbau auf die Position des roten Punktes (red position mark) des front cover plate assembly 1-1 ausgerichtet werden, gemäss Fig. 6

Fig. 6: Uebertragungshebel  
roter Punkt

DB (i) Zur Positions-Justierung von driving ring assembly 6-26 und des Blendenanzeigers von pointer assembly 6-19, Schraube 6-17 lösen und Knopf 6-24 drehen. Nach der Justierung wiederum Klebstoff auftragen gemäss (C) (b) (7).

(E) Reparaturanweisungen

Die hauptsächlich vorkommenden Defekte, deren Ursachen und Behebung sind in der folgenden Tabelle aufgeführt. Bitte alle Arbeiten mit höchster Präzision ausführen!

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DEFEKT	URSACHEN	BEHEBUNG
Verschluss kann nicht aufgelöst werden	1. Spannring und der arretieren- de Hakenhebel sind abgenützt.	1. tension ring assembly 2-57 oder charge lever assembly 2-35 ersetzen.
2. Kolben oder Spannring ist lose oder deformiert, und der Kol- ben dreht sich rückwärts.	2. Kolben oder Spannring ist lose oder deformiert, und der Kol- ben dreht sich rückwärts.	2. piston assembly 2-60 oder tension ring assembly 2-57 ersetzen.
3. Spannhebelfeder ist nicht am Haken eingehängt.	3. Spannhebelfeder ist nicht am Haken eingehängt.	3. Feder einhängen. Falls sie leicht herausgleitet, den Haken an der Feder zurechtbiegen.
4. Spannhebelfeder ist gebrochen	4. Spannhebelfeder ist gebrochen	4. charge lever spring 2-36 ersetzen
5. Staub hat sich zwischen dem Spannhebel und der Grund- platte festgesetzt, oder der Spannhebel bewegt sich mangels Öl nicht zurück.	5. Staub hat sich zwischen dem Spannhebel und der Grund- platte festgesetzt, oder der Spannhebel bewegt sich mangels Öl nicht zurück.	5. Gemäss (B) (b) (3) reinigen und ölen.
6. Die Hauptfeder ist gebrochen.	6. Die Hauptfeder ist gebrochen.	6. main spring 2-63 ersetzen.
7. Retainer 6-4 hat Spiel.	7. Retainer 6-4 hat Spiel.	7. Schraube 6-5 anziehen, ölen und verkleben gem. (B) (b) (19) (C) (b) (5).
8. Führungsschiene hat Spiel.	8. Führungsschiene hat Spiel.	8. Schraube 6-3 anziehen und verkleben gemäss (C) (b) (4).
9. Quitschen des driving ring assembly 6-26.	9. Quitschen des driving ring assembly 6-26.	9. reinigen und ölen gem. (B) (b) (20).
1/60 sek. ist zu langsam	1. Sektorenring ist gehemmt.  2. Spannring ist in der Drehbe- wegung gehemmt.	1. sector ring assembly 2-47 reinigen und ölen gem. (B) (b) (1).  2. tension ring assembly 2-57 Lager etc. reinigen und ölen gemäss (B) (a) (3).
ungenauere Zeiten (ausser 1/60)	1. Oelmangel  2. Die Lager des Hemmwerkes sind beschädigt oder das Ge- triebe ist abgenützt.	1. ölen gem. (B) (a) (1)  2. slow governor assembly 3-1 ersetzen.

BEHEBUNG

URASACHEN

DEFEKT

3. Niete der Platte für lange Zeiten am Spannring ist lose.

3. tension ring assembly 2-57 ersetzen.

1. B-Hebel ist beim Uebertragungshebel verbogen.

1. Krümmung im B lever assembly 2-23 begradigen.

2. Starke Reibung zwischen B-Hebel und Uebertragungshebel.

2. Kontaktfläche zwischen B lever assembly 2-23 und charge lever assembly 2-35 ölen gem. (B) (b) (8).

1. Lötstellen lose.

1. neu verlöten.

2. Blitzkabel ist unterbrochen.

2. flash lead wire 4-15, 4-16 ersetzen.

3. Kontakte sind verschmutzt.

3. Kontakte reinigen gem. (A) (a) (1).

4. Schraube bei Synchrostecker ist lose.

4. Schraube in synchro plug assembly 4-22 anziehen.

Rückseite eines Verschlussblattes ist durch Objektivtubus gehemmt

1. Zu grosse Ueberlappung der Verschlussblätter.  
1. justieren, sodass der Hauptspannebel schneller wirkt, durch ersetzen oder zusätzliches anbringen von stopper 2-2 und adjustment washer 2-4.

DB Uebertragungshebel von driving ring 6-26 und Blendenanzeiger stimmen nicht überein

1. Schraube zwischen drum 6-16 und worm shaft 6-15 ist lose.  
1. Winkel des Uebertragungshebels justieren und Schraube 6-17 anziehen.

DB Geringe Drehwirkung des Knopfes 6-24

1. Worm shaft 6-15 ist abgenützt.  
2. Nut in worm shaft 6-15 ist zu sammengedrückt.  
1. nut in worm shaft 6-15 vergrössern.  
2. nut vergrössern.

DB Skalenprofil klemmt im Gehäuse

1. Skala hat sich gelöst.  
1. scale profile assembly 6-25 ersetzen.

Fenster ist verschmutzt

1. Staub ist in das Gehäuse eingedrungen.  
1. window 6-20 reinigen gem. (A) (b)

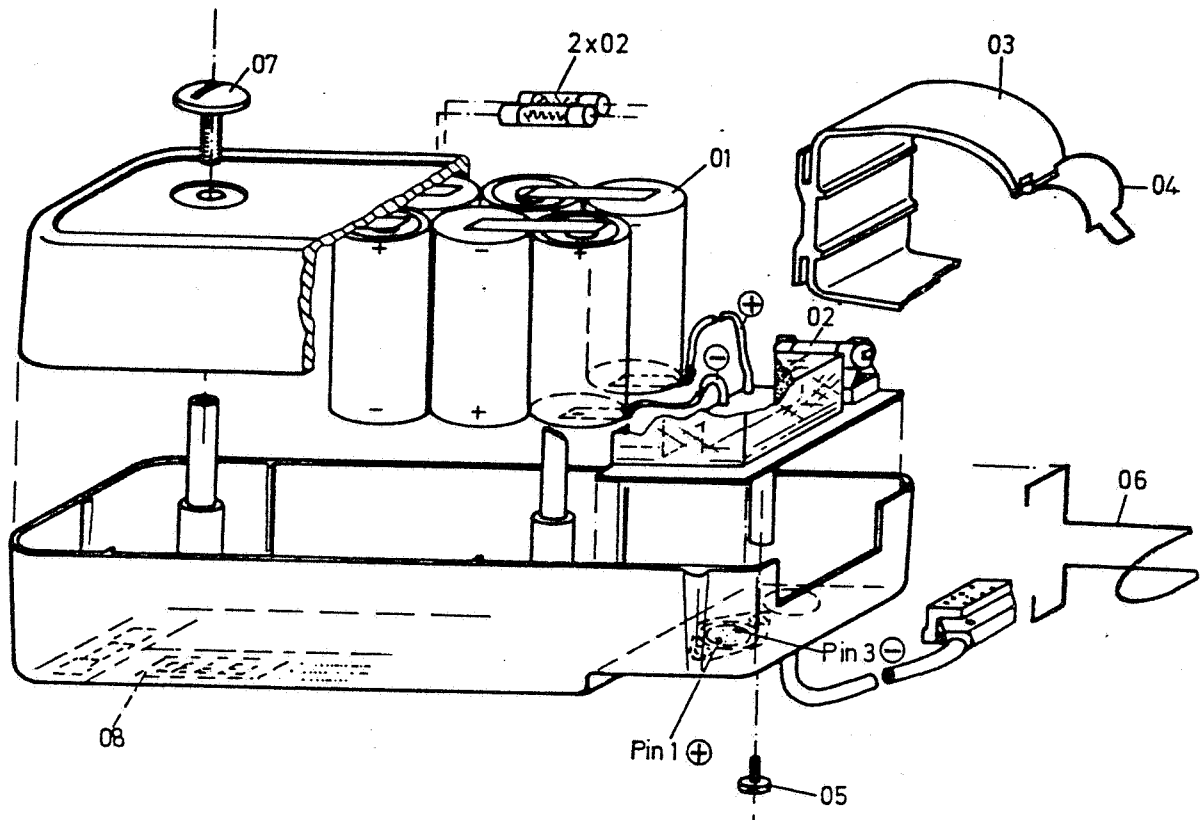
Lubricating and Binding = Schmieren und verkleben

Binding Agent = Klebstoff

Grease = Fett

Soldering = Löten





In case of insufficient capacity the set of accumulators (A) is to be exchanged.  
Reason: Normal wear and tear

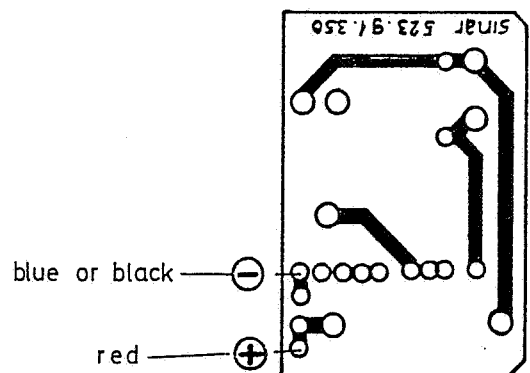
A) Exchange of accumulator set (no. 523.91.200)

- a) Twist off screw position 05, pull out accu.  
Lift off print and turn it. Unsolder red (+) and blue (black) (-) thread of accu on print.
- b) Solder threads of new set of accu onto print (electro-diagram see over-leaf!)  
Attention: Avoid short-circuiting!
- c) Put set of accus into case with connection points facing down. Assemble accu-print and cover of case, test good functioning.

Attention: Use fuse no. 173.90.005 only!

In any case, unsolder stranded wires on print side!

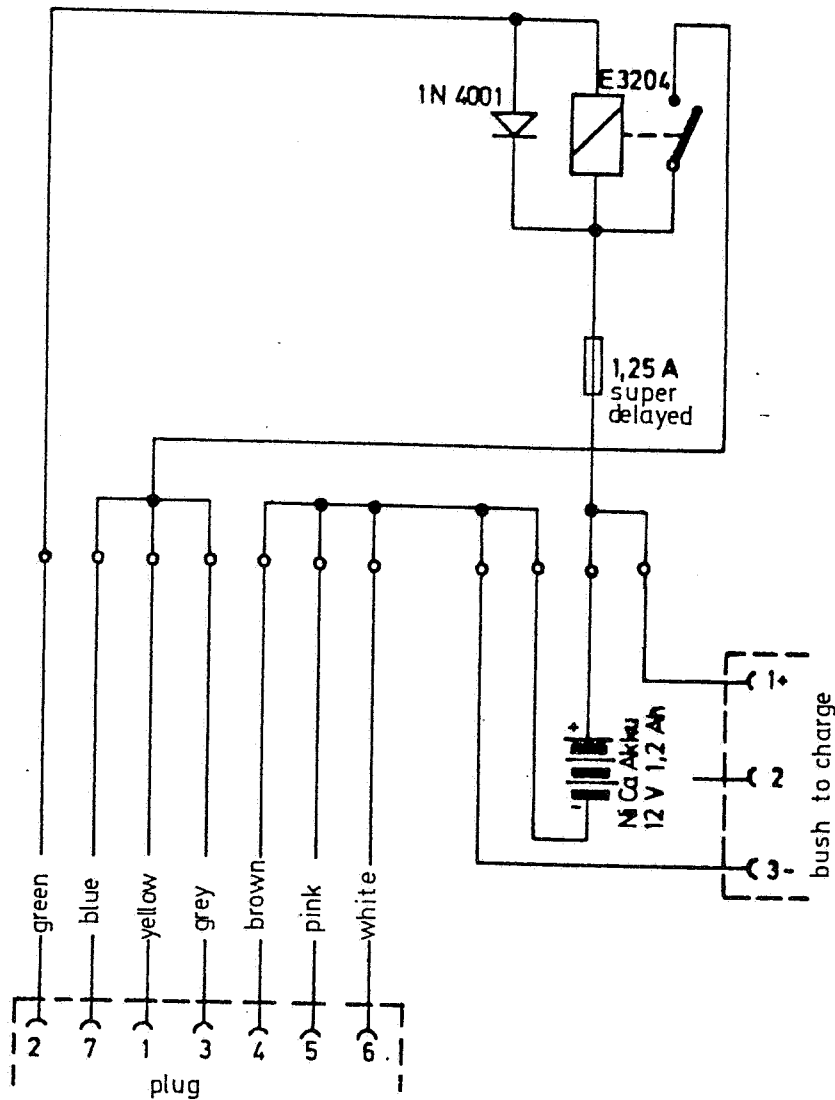
Print of accumulator  
on soldering side



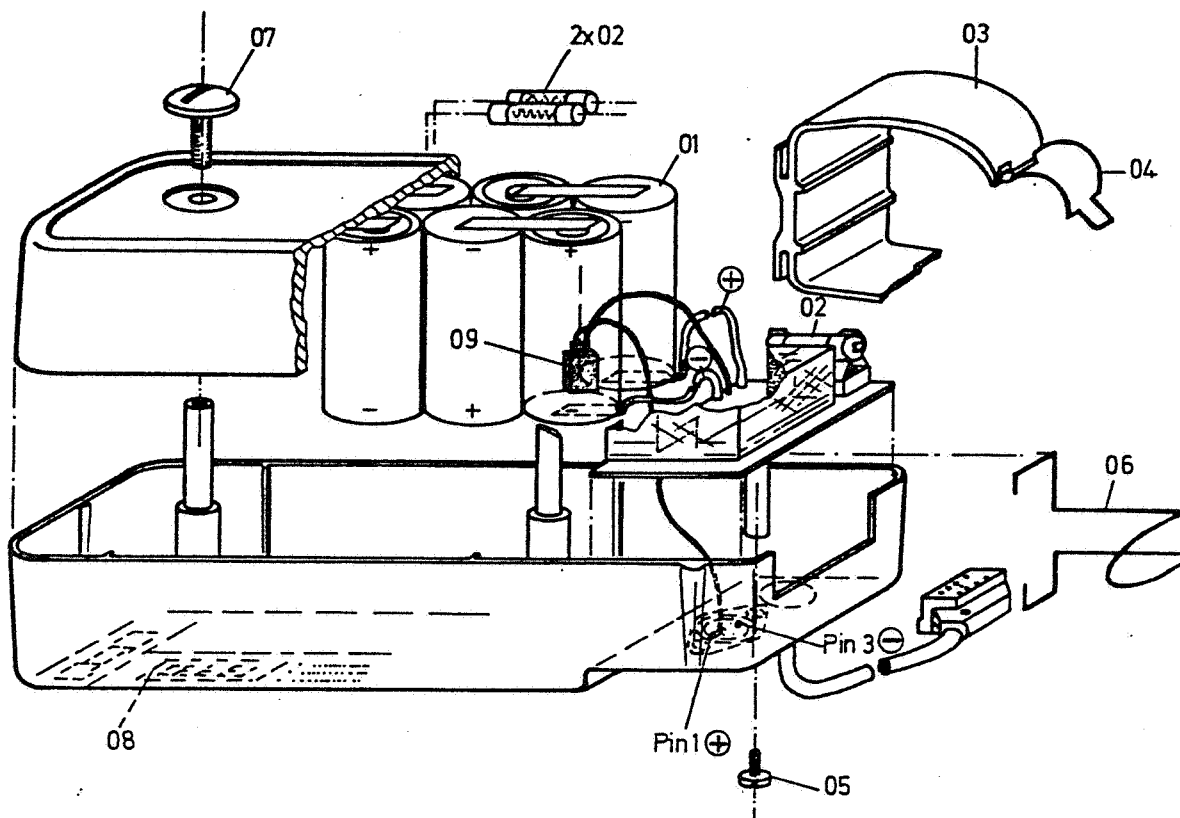
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Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange	Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange
01	523.91.200		
02	173.90.005		
03	523.91.301		
04	523.91.503		
05	162.25.079		
06	523.91.502		
07	431.31.532		
08	523.91.504		

electrical scheme



523.91



In case of insufficient capacity the set of accumulators (A) is to be exchanged.  
Reason: Normal wear and tear

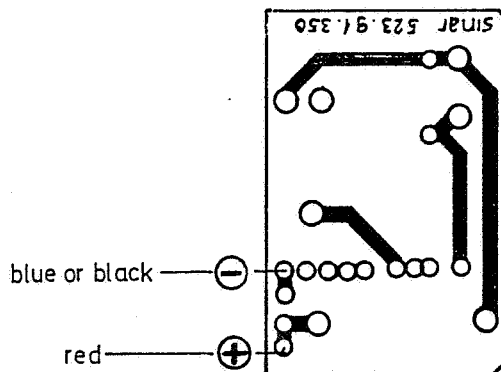
A) Exchange of accumulator set (no. 523.91.200)

- a) Twist off screw position 05, pull out accu.  
Lift off print and turn it. Unsolder red (+) and blue (black) (-) thread of accu on print.
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Attention: Avoid short-circuiting!
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Attention: Use fuse no. 173.90.005 only!

In any case, unsolder stranded wires on print side!

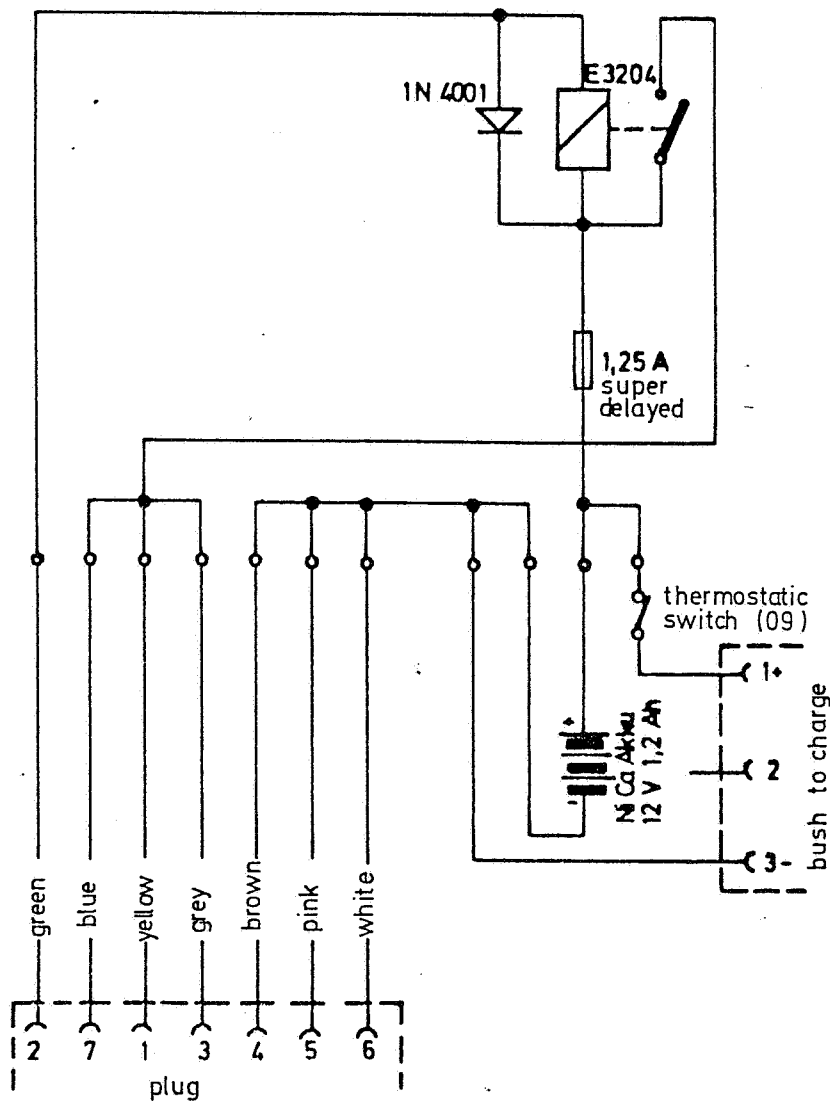
Print of accumulator  
on soldering side



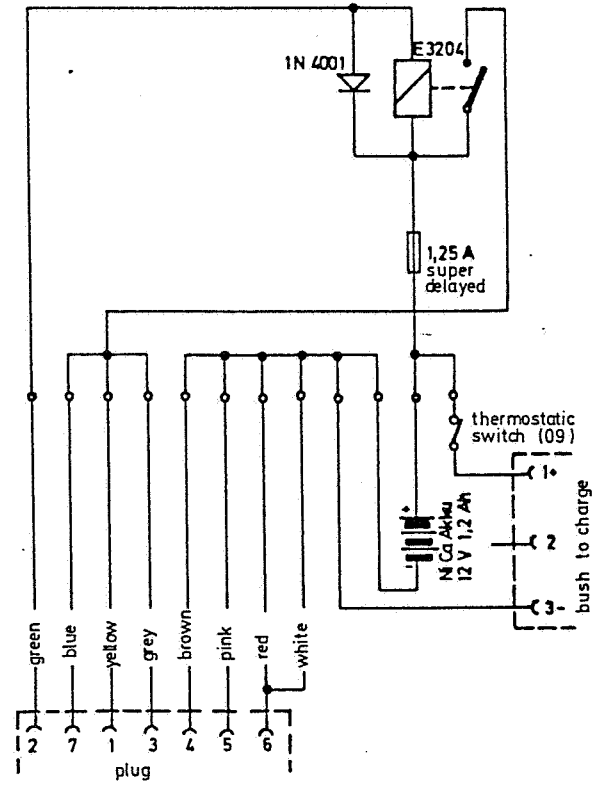
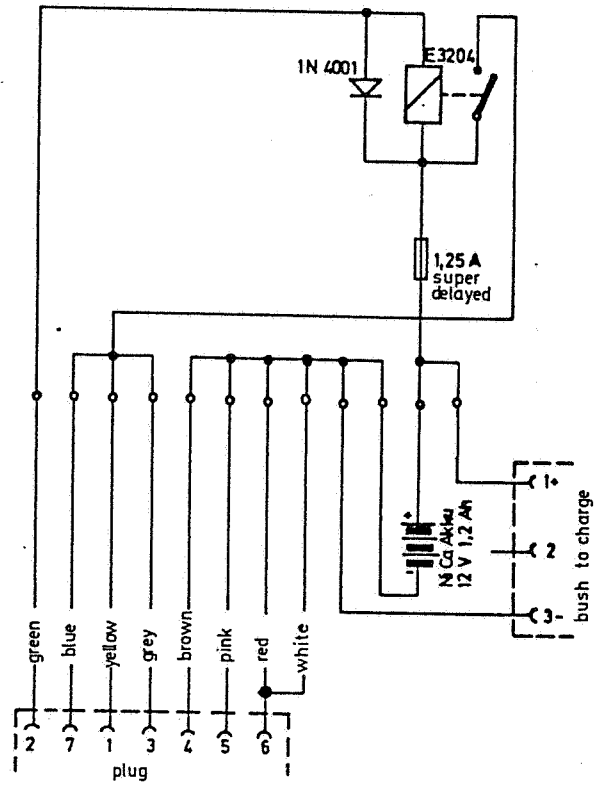
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08	523.91.504		
09	173.90.500		

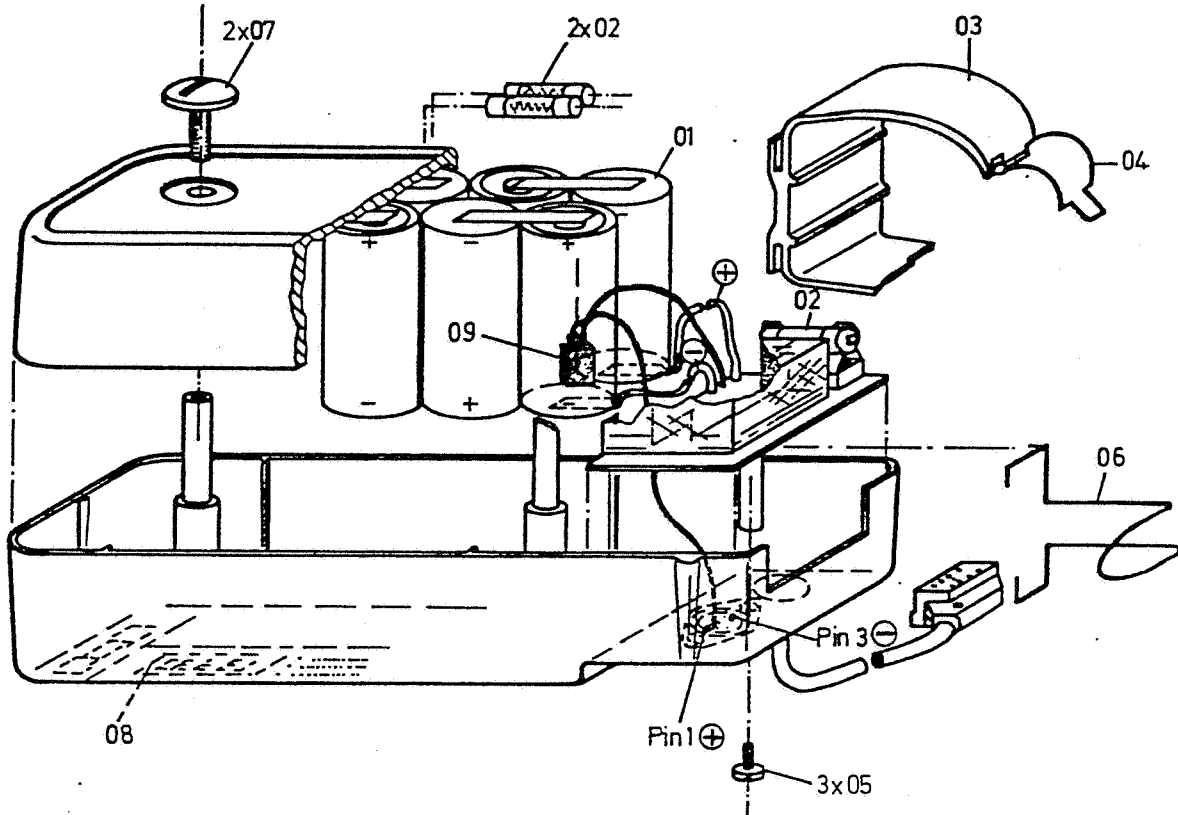
electrical scheme



523.91



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In case of insufficient capacity the set of accumulators (A) is to be exchanged.  
Reason: Normal wear and tear

A) Exchange of accumulator set (no. 523.91.200)

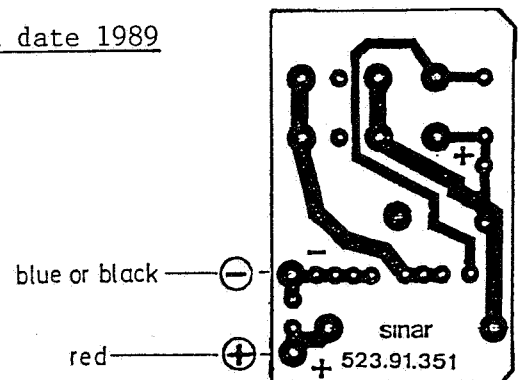
- a) Twist off screw position 05, pull out accu.  
Lift off print and turn it. Unsolder red (+) and blue (black) (-) thread of accu on print.
- b) Solder threads of new set of accu onto print (electro-diagram see over-leaf!)  
Attention: Avoid short-circuiting!
- c) Put set of accu into case with connection points facing down. Assemble accu-print and cover of case, test good functioning.

Attention: Use fuse no. 173.90.005 only!

In any case, unsolder stranded wires on print side!

Print of accumulator  
on soldering side

from date 1989



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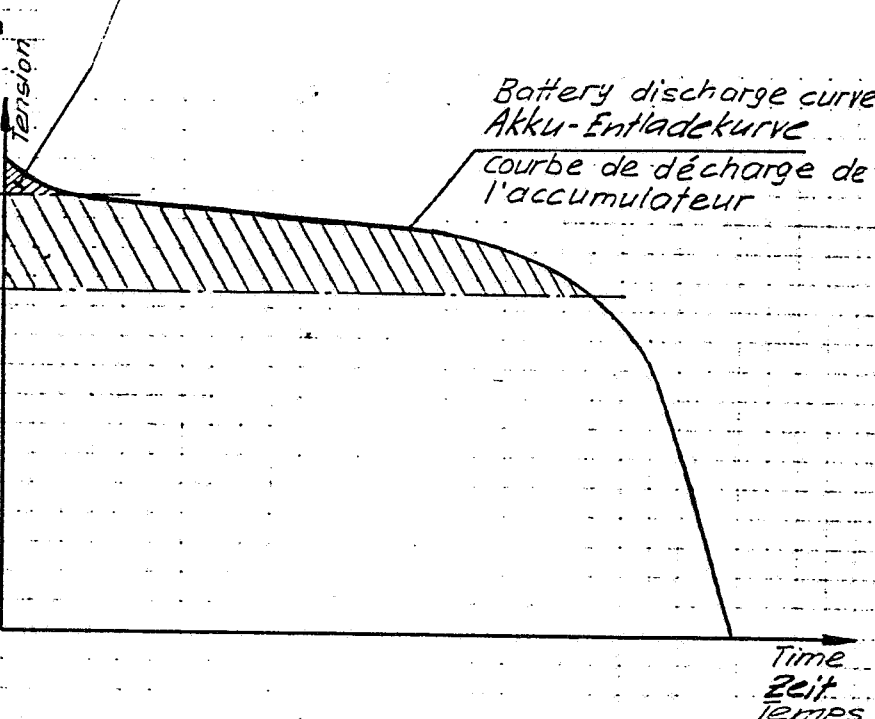


523.91.

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- Display 000 00 and automatic switchoff or switch on not possible.
- Anzeige 000 00 und autom. Ab-schaltung bzw. Einschalten nicht möglich
- autom. switchoff
- autom. Abschaltung
- déclenchement automatique
- keine autom. Abschaltung
- pas de déclenchement autom.
- Affichage 000 00 et déclenchement autom. resp. enclenchement impossible

Voltage  
Spannung  
Tension

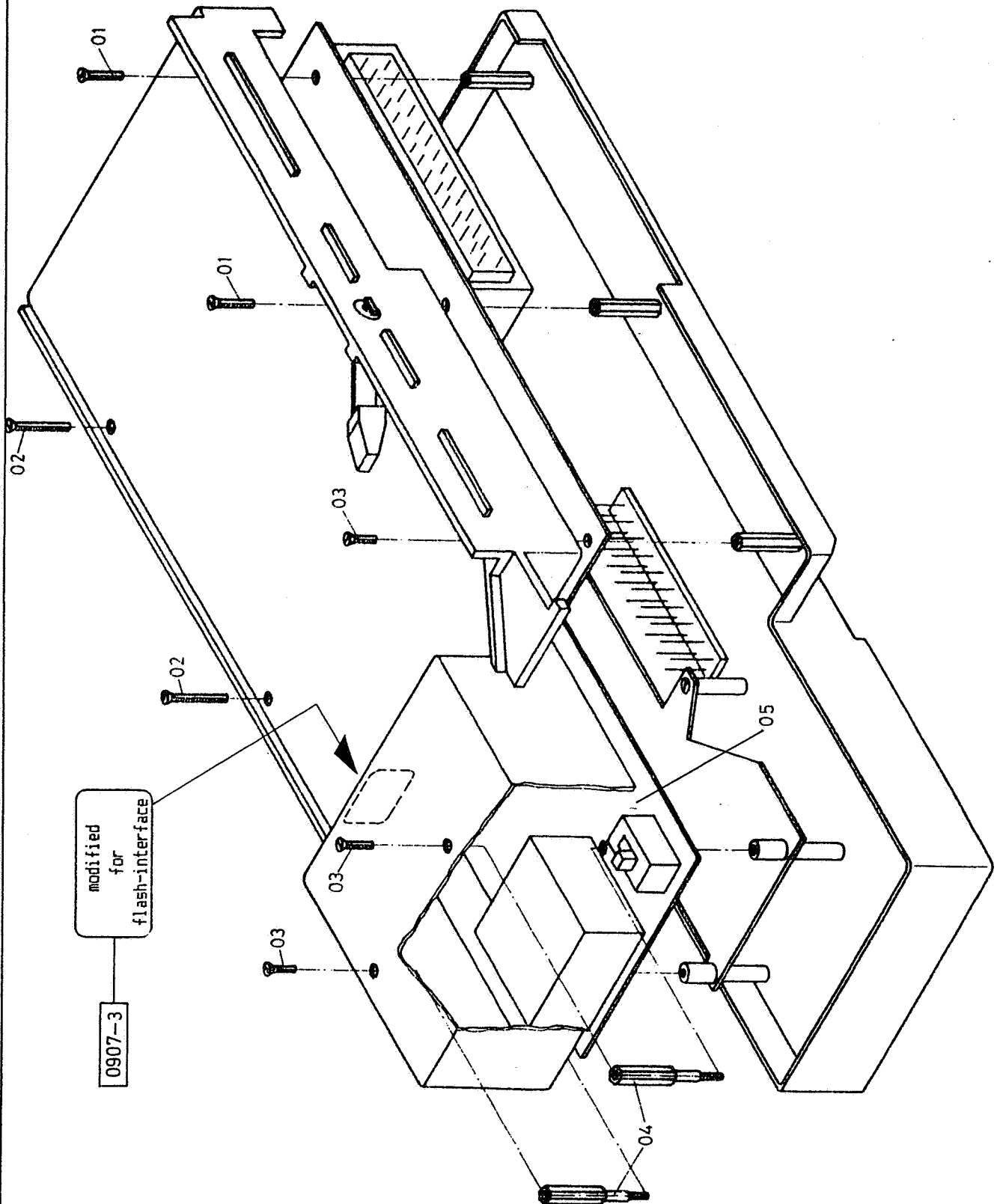


This zone is utilized to prevent automatic switchoff. If needed, permanent recharging of the battery (power supply connected to convenience outlet) replaces the blinking display by a continuous display which may be desirable in studio work.

Spickel wird ausgenutzt, um automatische Abschaltung zu verhindern. Dadurch wird im Bedarfsfall durch dauernde Nachladung des Akkus (Netzbetrieb) die blinkende Anzeige durch eine kontinuierliche Anzeige ersetzt, was im Studiobetrieb wünschenswert sein kann.

Le coin est utilisé pour empêcher un déclenchement automatique. Ainsi, en cas de besoin, par une recharge permanente de l'accumulateur (emploi sur le secteur) l'affichage clignotant est remplacé par un affichage continu, ce qui peut être favorable pour l'utilisation en studio.

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SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0907-1

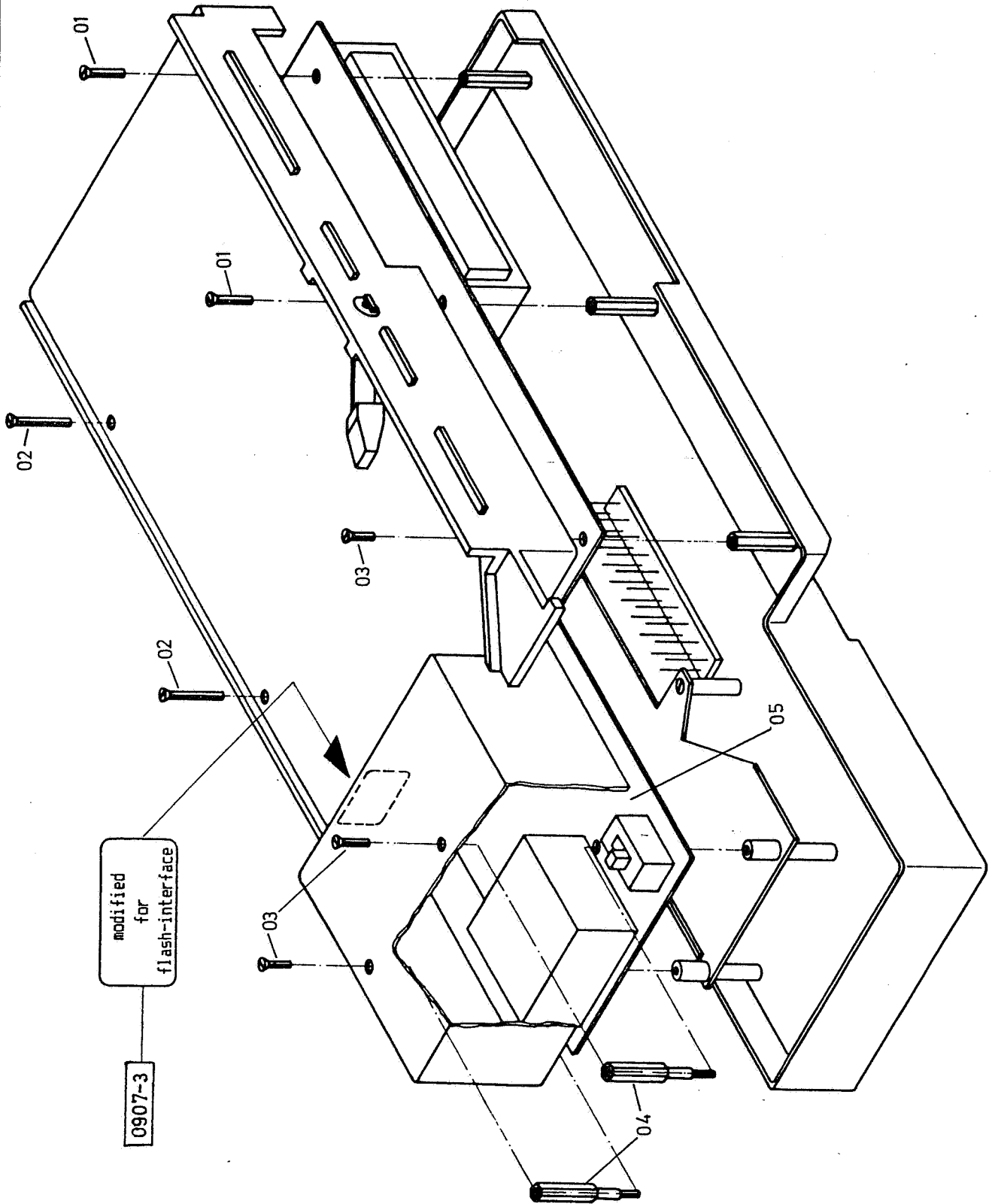
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DATUM 94/10/14

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	162.82.071	2	162.82.074
3	162.82.070	4	522.41.563
5	522.41.101		

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modified  
for  
flash-interface

0907-3

SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0907-2

\*\*\*\*\*

DATUM 94/10/14

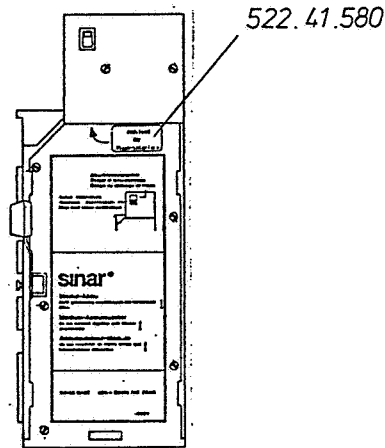
INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	162.82.071	2	162.82.074
3	162.82.070	4	522.41.563
5	522.41.101		

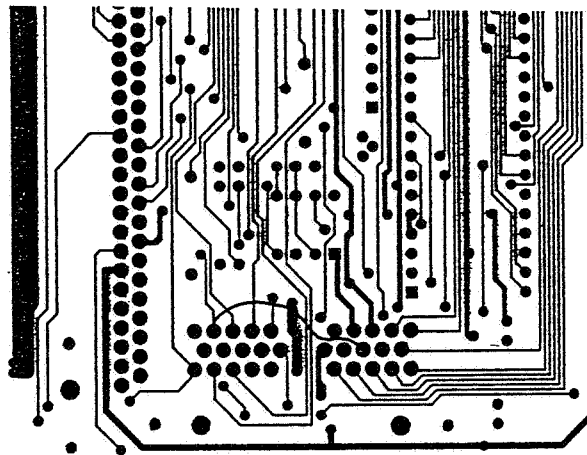
modified  
for  
flash-interface

Attention

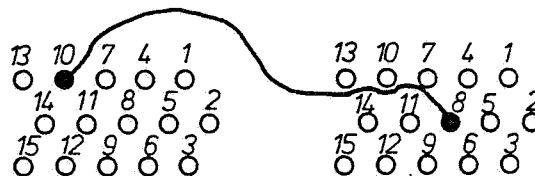
On each converted module a label (522.41.580) must be stuck on the outer backside of the casing clearly visible



Print: side of soldering



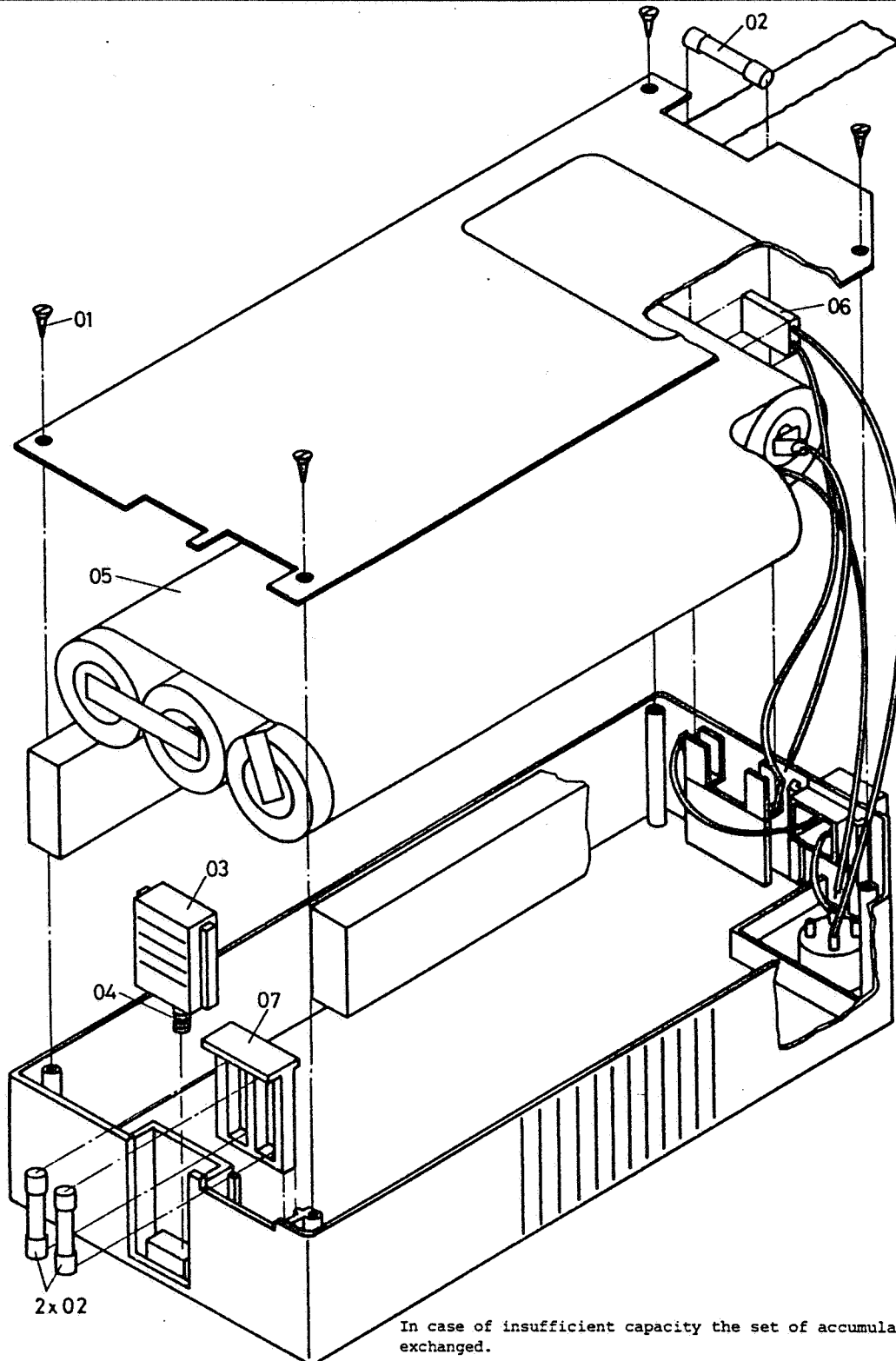
wrap wire (190.10.000)



plug for SINARSIX-dig.      plug for flash-interface

solder wrap wire: plug for SINARSIX-digital PIN 10  
plug for flash-interface PIN 8

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Deutsch siehe Rückseite

Français voir au verso

In case of insufficient capacity the set of accumulators (A) is to be exchanged.

Reason: Normal wear and tear

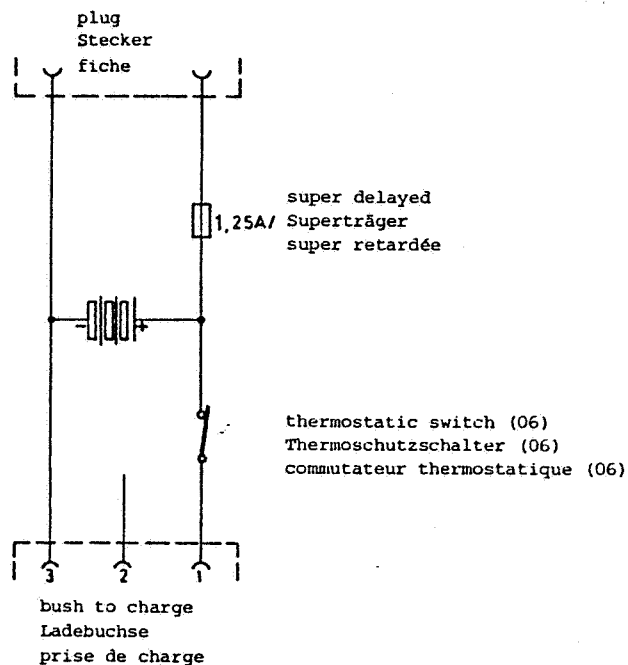
A) Exchange of accumulator set (no. 522.91.200)

- a) Twist off screw position 01, pull out accu.  
Lift off print and turn it. Unsolder red (+) and blue (black) (-) thread of accu on print.
- b) Solder threads of new set of accu onto print (electro-diagram see overleaf!)  
Attention: Avoid short-circuiting!
- c) Put set of accu into case with connection points facing down.  
Assemble accu-print and cover of case, test good functioning.

Attention: Use fuse no. 173.90.005 only!

Fig No.	Part No. Ersatzteil Nr. No pièce de rechange
01	164.61.122
02	173.90.005
03	522.91.301
04	168.00.050
05	522.91.200
06	173.90.500
07	522.91.303

Electrical scheme  
Elektr. Schema  
Schéma électrique



Resultieren zu wenig Auslösungen aus einer Akkuladung, so ist der Akkusatz (A) auszuwechseln.

Grund: Normale Gebrauchs- und Alterserscheinung

A) Auswechseln vom Akkusatz (522.91.200)

- Schraube Pos. 01 heraus-schrauben, Akkusatz aus dem Gehäuse entnehmen. Roter (+) und blauer (schwarzer) (-) Draht vom Akkus auslöten.
- Die Drähte vom neuen Akkusatz einlöten. (Schema siehe Rückseite)  
Achtung: Keinen Kurzschluss verursachen!
- Akkusatz in das Gehäuse einsetzen, Gehäusedeckel montieren, Funktion prüfen.

Achtung: Nur Sicherung 173.90.005 verwenden!

Si le chargement d'accus donne un nombre insuffisant d'expositions, le jeu d'accus (A) est à échanger.

Raison: Usure normale

A) Echanger le jeu d'accus (no 522.91.200)

- Dévisser vis pos. 01, sortir le jeu d'accus du boîtier. Sortir le print et le tourner. Desserder le fil rouge (+) et bleu (noir) (-) de l'accu sur le print.
- Souder le fil du nouveau jeu d'accus sur le print (voir électro-diagram au verso!)  
Attention: Eviter des court-circuits!
- Placer le jeu d'accus dans le boîtier avec les contacts vers le bas. Monter le print et le couvercle. Tester bon fonctionnement.

Attention: User exclusivement fusible no 173.90.005

### Zulässige Arbeiten am Expolux Verschluss

Die ausführbaren Servicearbeiten beschränken sich auf den Ersatz der in den Partlists aufgeführten Komponenten, und der damit verbundenen Demontage- resp. Montagearbeiten am Gerät selbst.

- Keine Lötarbeiten vornehmen

Beachten Sie in diesem Zusammenhang die Gewährleistungs-Bestimmungen auf Seite 21 der Gebrauchsanleitung für das Sinar Expolux System.

Verschlussfunktionen überprüfen mit Kontrolleinheit 109.05.651.

### Authorized repairs on the Expolux shutter

The service performance being practicable is limited to the replacement of the components which are specified in the part lists and the respective disassembling and assembling of the device itself.

- No soldering

In this connection, please do note the warranty conditions on page 21 of the instruction manual of the Sinar Expolux system.

Check the shutter functions with the control unit 109.05.651.

### Réparations autorisées sur l'obturateur Expolux

Les travaux de service réalisables se limitent au remplacement des composants figurant dans les listes des pièces de rechange et aux travaux de démontage resp. de montage y respectifs sur l'appareil même.

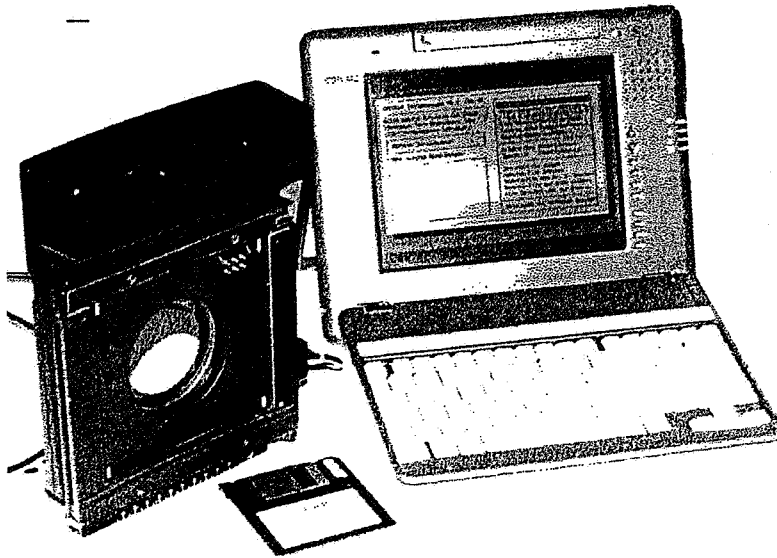
- Ne sonder nulle part

Veuillez observer dans ce contexte les conditions de garantie à la page 21 du mode d'emploi pour le système Sinar Expolux.

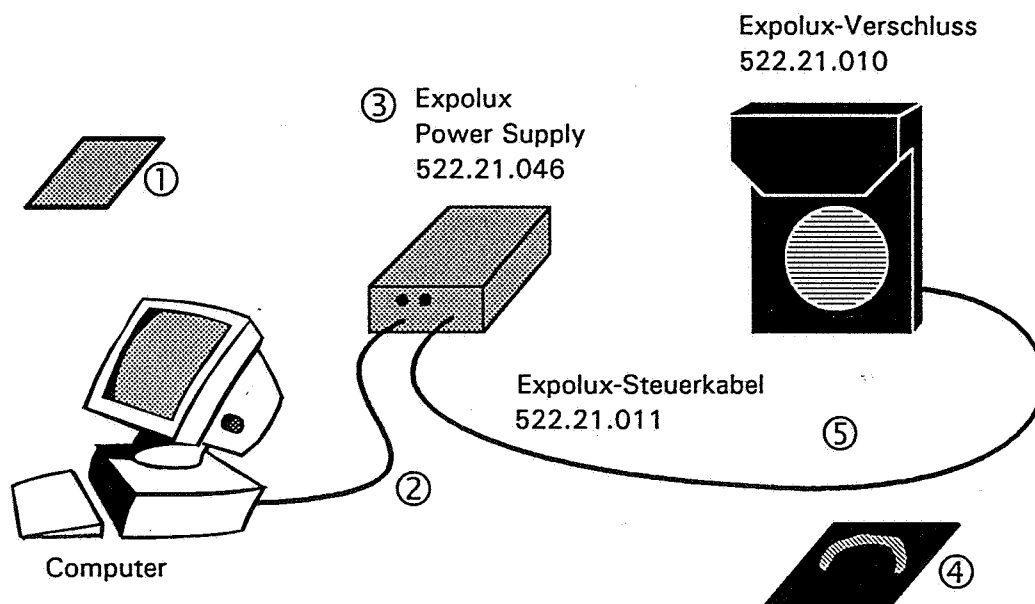
Contrôler les fonctions d'obturateur avec l'unité de contrôle 109.05.651.

## Kontrolleinheit 109.05.651

für Expolux-Verschuss und Expolux-Tricolor Verschluss



### Material



Pos	Bezeichnung	Nummer
1	Testprogramm auf Diskette	109.05.682
2	Modemkabel RS232 für PCs, 4 m	718.21.130
3	Expolux-PowerSupply mit RS232-Schnittstelle	522.21.046
4	Prüfplatte für Blendenpositionen	109.05.680
5	Expolux Steuerkabel	522.21.011



## Beschreibung des Expolux-Testprogramms Version 1.5, Feb.1995

### Hauptmaske des EXPOLUX- Testprogramms:

Wählen Sie im Hauptmenu mit  
↑ oder ↓ eine Funktion aus  
und drücken Sie die  
ENTER-Taste.

EXPOLUX Testprogramm V1.5 Feb 95														
Bitte wählen Sie eine der nebenstehenden Test-Funktionen aus: (ESC: Testprogramm beenden!)														
EXPOLUX-Seriennummer: X002	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>Eingangskontrolle</b></td> </tr> <tr> <td style="padding: 2px;">Ausgangskontrolle / Service#1</td> </tr> <tr> <td style="padding: 2px;">Eine Kommentarzeile anfügen...</td> </tr> <tr> <td style="padding: 2px;">Interne Bemerkungen anfügen...</td> </tr> <tr> <td style="padding: 2px;">Expolux-Epron anzeigen</td> </tr> <tr> <td style="padding: 2px;">Allgemeiner Funktionstest</td> </tr> <tr> <td style="padding: 2px;">Spezielle Funktionstests</td> </tr> <tr> <td style="padding: 2px;">Service-File zeigen</td> </tr> <tr> <td style="padding: 2px;">Service-File drucken</td> </tr> <tr> <td style="padding: 2px;">Servicefile von Nr. X drucken</td> </tr> <tr> <td style="padding: 2px;">Service-File auf Disk sichern</td> </tr> <tr> <td style="padding: 2px;">Alle Servicefiles auf Disk s.</td> </tr> <tr> <td style="padding: 2px;">Objv.code auf Etiketle drucken</td> </tr> </table>	<b>Eingangskontrolle</b>	Ausgangskontrolle / Service#1	Eine Kommentarzeile anfügen...	Interne Bemerkungen anfügen...	Expolux-Epron anzeigen	Allgemeiner Funktionstest	Spezielle Funktionstests	Service-File zeigen	Service-File drucken	Servicefile von Nr. X drucken	Service-File auf Disk sichern	Alle Servicefiles auf Disk s.	Objv.code auf Etiketle drucken
<b>Eingangskontrolle</b>														
Ausgangskontrolle / Service#1														
Eine Kommentarzeile anfügen...														
Interne Bemerkungen anfügen...														
Expolux-Epron anzeigen														
Allgemeiner Funktionstest														
Spezielle Funktionstests														
Service-File zeigen														
Service-File drucken														
Servicefile von Nr. X drucken														
Service-File auf Disk sichern														
Alle Servicefiles auf Disk s.														
Objv.code auf Etiketle drucken														
SINAR-Interne Bemerkungen:														
Prototyp 2														
-----														
In Abteilung Elektronik Darf Firma nicht verlassen!														

### Eingangskontrolle

Ueber jeden Verschluss existiert ein Servicefile, das die Aktionen und das Datum der Verschlussprüfungen enthält. Alle Aktionen am Verschluss werden hier festgehalten und können jederzeit eingesehen und ausgedruckt werden. Bei der Eingangskontrolle wird der aktuelle Zustand des Verschlusses im Servicefile festgehalten .

Eingangskontrolle :		
ENTER : Einträge werden in das Servicejournal aufgenommen, ESC : Zurück ins Hauptmenu.		
Datum	Zeit	Kommentar
03.02.95	09:36	Eingangskontrolle / Aktueller Zustand
-----		
Anzahl Auslösungen total : 12219		
Version und Servicenummer : 1.4 04		
Anzahl Fehler Lamellen 1/2 : 623 109		
Anzahl Fehler Blende/Epron : 3 0		

## Allgemeiner Funktionstest

Beim allgemeinen Funktionstest können die Verschlussfunktionen wie in der Schnittstellen-spezifikation vom 1.11.91 definiert, überprüft werden.

Aktuelle Verschlusseinstellungen		<TO DIGI>	<FROM DIGI>
Arbeitsblende : 16		01 z / 122	01 00000000
Belichtungszeit : 1/8		02 l / 108	02 00000000
Blitz-Modus : Spät Blitz		03 l / 108	03 00000000
Objektiv-Code : 04224		04 l / 108	04 00000000
ESC: Zurück		05 o / 111	05 00000000
Bei Tricolor:		06 r / 114	05 00000000
F2 : Einstellungen	-----	07 o / 111	05 01000010
R : Reset	1 : RGB	08 n / 109	05 00100100
Z : Verschl. zu	2 : kein Filt	09 ? / 130	06 00000000
X : Belichten	3 : Nur rot	10 ? / 000	07 00000000
A : Verschl. auf	4 : Nur grün	11 ? / 004	07 00000000
0 : Objektivcode	5 : Nur blau	12 ? / 000	07 01000010
		13 ? / 002	07 00100100
		14 b / 098	13 00000000
		15 ? / 016	16 00000000
		16 ? / 000	17 00000000
		17 n / 110	18 00000000
		18 z / 122	

## Spezielle Funktionstests

Bei den speziellen Funktionstests können verschiedene Tests ausgeführt werden, die z.T. mit externen Messgeräten überprüft werden. Jeder erfolgreiche Funktionstest wird im Servicefile vermerkt. Am Schluss eines Prüfungsvorgangs sollen noch eine Anzahl zufällige Auslösungen gemacht werden, um den Verschluss im Dauerbetrieb zu testen. Nach diesen Auslösungen dürfen keine zusätzlichen Blenden- oder Lamellenfehler entstanden sein!

Spezielle Funktionstest:		Lamellenposition kontrollieren	
Bitte führen Sie nacheinander die nebenstehenden Tests aus. Jeder Test kann wiederholt werden!		Drehrichtung	kontrollieren
Nur ein erfolgreicher Test wird in Servicejournal eingetragen. Falls ein Test nicht bestanden wird, muss der Test später nach Behebung des Fehlers wiederholt werden.		Früh- /Spätblitz	kontrollieren
Beenden Sie diese Funktionstests mit ESC, um wieder ins Hauptmenu zu gelangen.		Bel.zeit 1/500	kontrollieren
		Alle Blendenpositionen bis 128	
		Alle Belichtungszeiten bis 1s	
		Lamellen einzeln bewegen	
		Objektivwechsel erkennen	
		Visuelle Kontrolle	
		? Zufällige Auslösungen ...	
		100 zufällige Auslösungen ...	
		250 zufällige Auslösungen ...	
		Zurück ins Hauptmenu	

## Ausgangskontrolle

Nach einer erfolgreichen Prüfung des Verschlusses wird mit der Ausgangskontrolle die Servicenummer um 1 erhöht und alle Fehler (Lamellenfehler, Blendenfehler) auf 0 gesetzt.  
**ACHTUNG:** Die Anzahl Auslösungen des Verschlusses wird mit dieser Funktion nicht verändert!  
 Der aktuelle Zustand nach der Ausgangskontrolle wird wiederum im Servicefile gespeichert.

## Eine Bemerkung anfügen

Es kann jederzeit eine Bemerkung - mit Zeit und Datum versehen - an das Servicefile angefügt werden.

Bemerkung einfügen:		
ENTER : Einträge werden in das Servicejournal aufgenommen, ESC : Zurück ins Hauptmenu.		
Bitte ändern Sie - wenn nötig - die angezeigte Kommentarzeile ab.		
Datum	Zeit	Kommentar
03.02.95	09:38	█

## Expolux-Eprom anzeigen

Auf dieser Seite werden alle im sogenannten Extended Status enthaltene Daten angezeigt. Diese können hier nicht editiert werden, sondern zeigen nur den aktuellen Zustand des Verschlusses in einer Uebersicht an.

Expolux Extended Status:		
Zeit	: 1/30	128/0
Blende	: 4	004/0
Blitz	: Spät Blitz	2
Lan1 Pos	: 0	(0 .. 17401
Lan2 Pos	: 0	(0 .. 17401
ADC1-4	: 233 ,136 ,136 ,233	
ADC5-8	: 39 ,156 ,0 ,22	
Objv-Code	: 04224	
Spannung	: 30	
Strom	: 0	
Temp.	: 22	
Serien-Nr.	: X002	
Service-Nr.	: 4	
Version	: 1.4	
Datum	: 15.10.92	
Anzahl Auslös.	: 12219	
Fehler Lan1	: 623	
Fehler Lan2	: 109	
Fehler Blende	: 3	
Fehler EEprom	: 0	

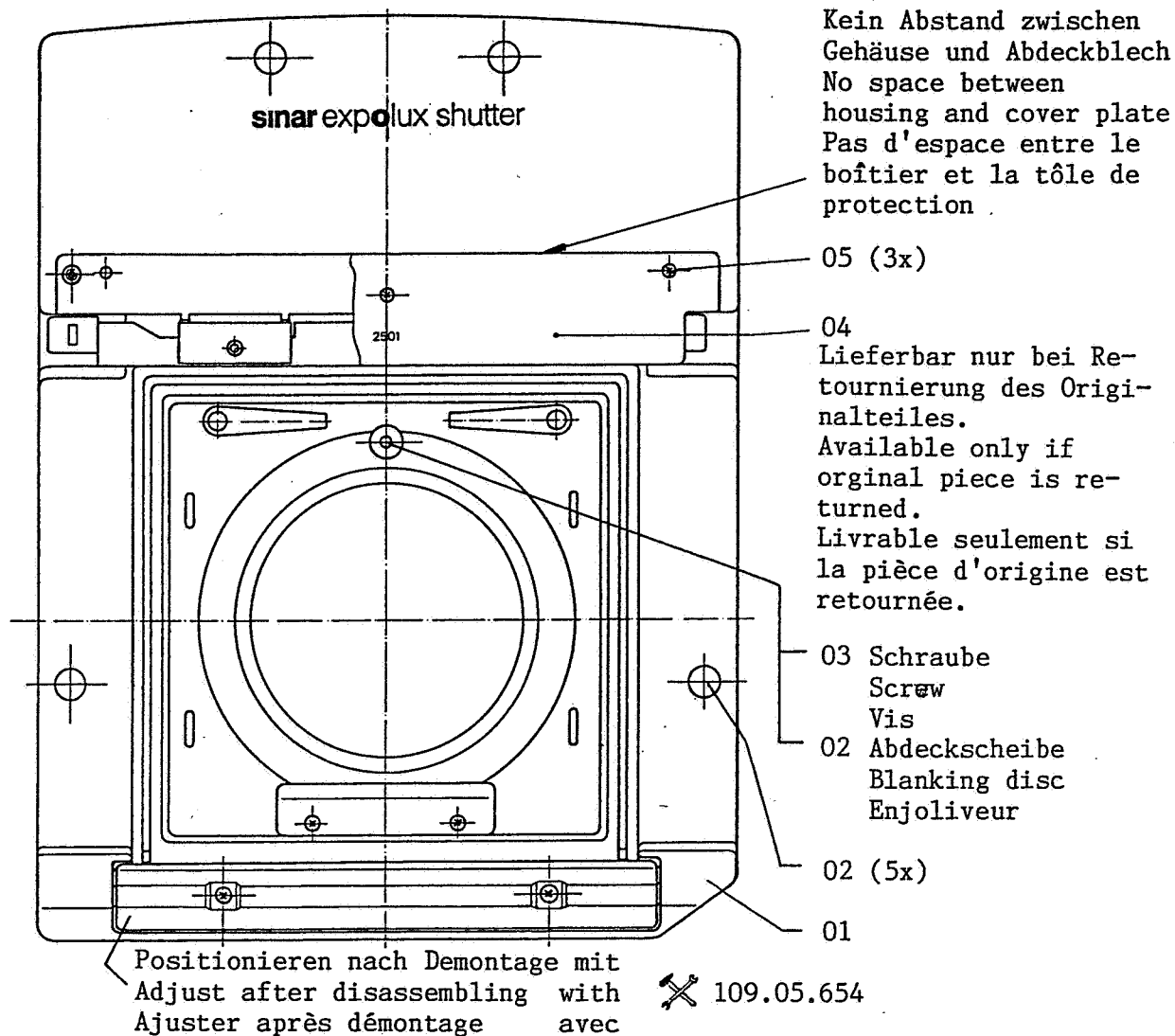
OK : Nochmals lesen  
 ESC : Zurück ins Hauptprogramm

Bitte beachten Sie, dass sich zwischen Gehäuserückteil Pos 01 und der Grundplatte gem. Serviceblatt 0909-3 eine Druckfeder befindet, (Pos 21 auf Blatt 0909-3) welche beim Zusammenbauen des Verschlusses nicht vergessen werden darf.

Please note that there is a pressure spring (pos 21 on sheet 0909-3) between the back part of the housing (pos 01) and the base plate according to service sheet no. 0909-3, which may not be forgotten when assembling the shutter.

Veuillez remarquer qu'un ressort de pression (pos 21 sur feuille de service 0909-3) se trouve entre le dos du boîtier pos 01 et la plaque de base selon feuille de service 0909-3.

Elle ne doit pas être oubliée lors du réassemblage de l'obturateur.



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### Spare parts - Ersatzteile - Pièces de rechange

Fig. No.	Part No. Ersatzteil Nr. No. pièce de rechange	Fig. No.	Part No. Ersatzteil Nr. No. pièce de rechange
01	522.21.100	02	522.21.527
03	161.83.055	04	522.21.489
05	164.11.096		

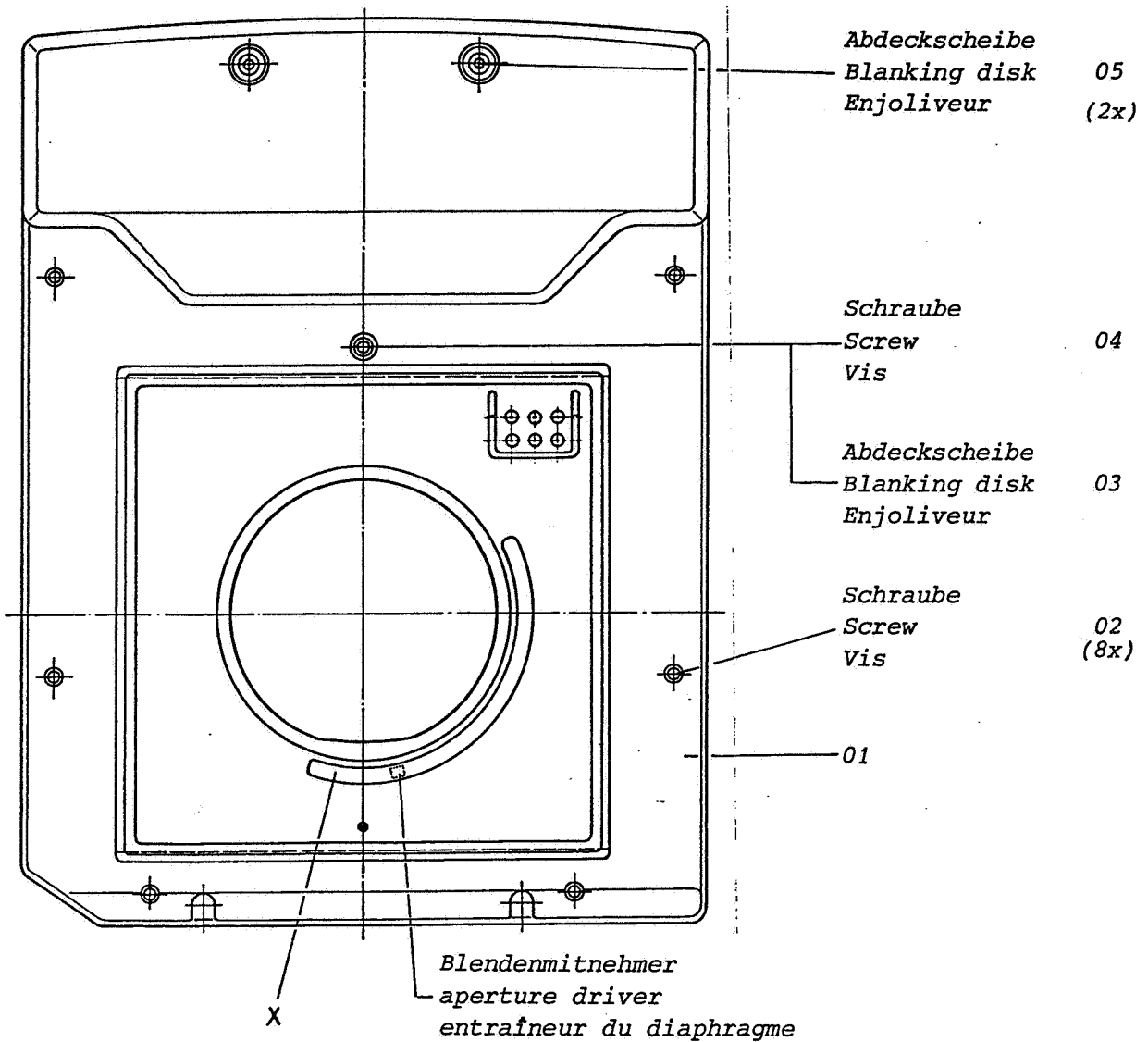
522.21.010

Vor Aufsetzen des Gehäusevorderteiles Pos. 01 Blendenmitnehmer (Blendenantriebsring Pos. 01 auf Serviceblatt 0909-3) innerhalb der Oeffnung "X" positionieren, da sonst Kollision mit Gehäuse.

Before mounting the front housing pos. 01 position aperture driver (aperture driving ring pos. 01 on service sheet 0909-3) inside of the aperture "X" since otherwise collision with pos. 01.

Positionner l'entraîneur du diaphragme (bague d'entraînement de diaphragme pos. 01 sur la feuille de service 0909-3) à l'intérieur de l'ouverture "X" avant le montage du devant du boîtier pos. 01 afin d'éviter la collision avec pos. 01.

Pos. 02: Anziehdrehmoment  
initial torque 35 - 40 Ncm  
couple de serrage



**Spare parts - Ersatzteile - Pièces de rechange**

Fig. No.	Part No. Ersatzteil Nr. No. pièce de rechange	Fig. No.	Part No. Ersatzteil Nr. No. pièce de rechange
01	522.21.301	02	164.11.106
03	522.21.527	04	164.11.116
05	433.67.519		

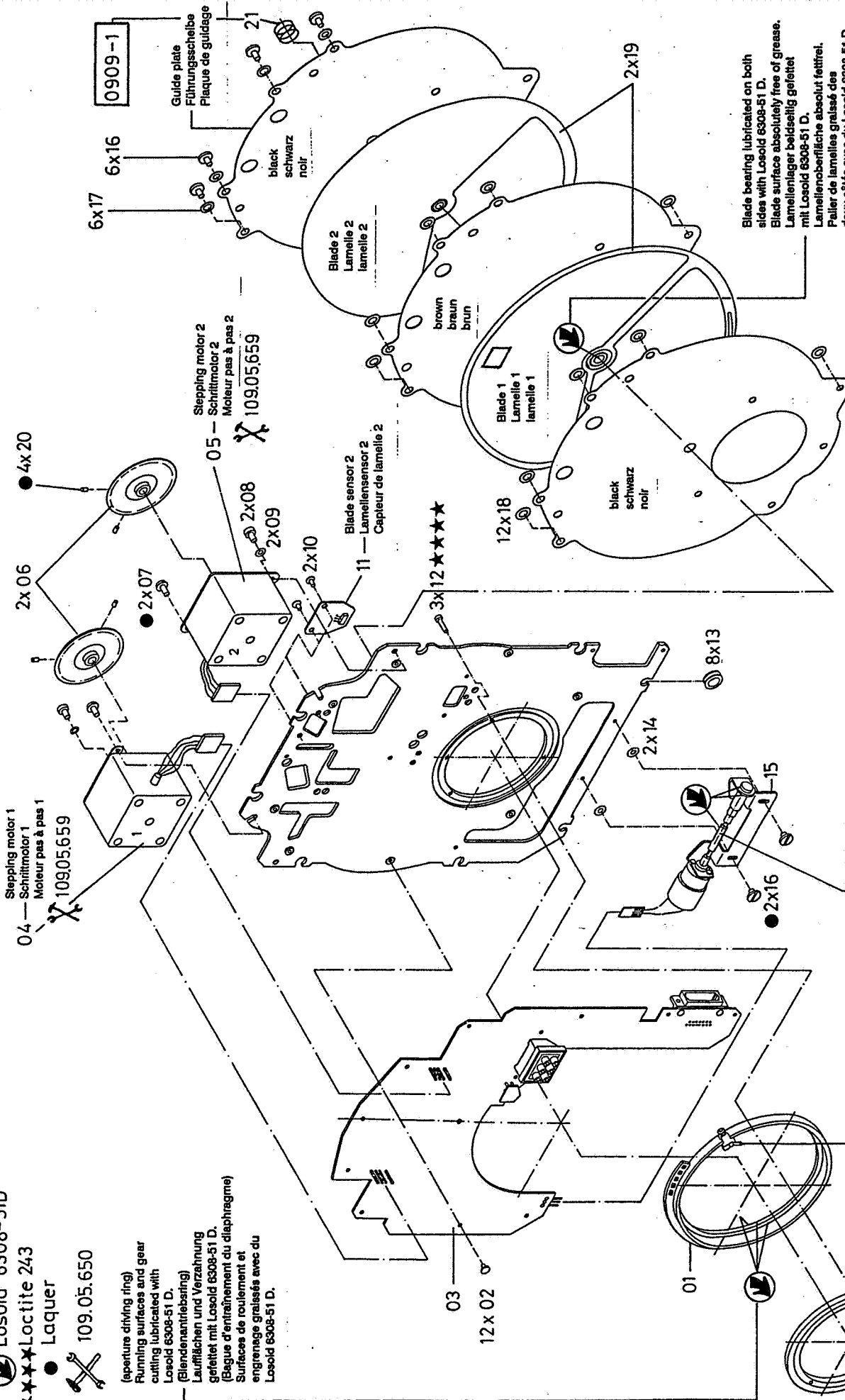
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522.21.010

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- Losoid 6308-51D
- ★★★Loctite 243
- Laquer
- 109.05.650

(aperture driving ring)  
Running surfaces and gear  
cutting lubricated with  
Losoid 6308-51 D.  
(Blendenantriebsring)  
Laufflächen und Verzahnung  
gefettet mit Losoid 6308-51 D.  
(Bague d'entraînement du diaphragme)  
Surfaces de roulement et  
engrenage graissés avec du  
Losoid 6308-51 D.



SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0909-3

\*\*\*\*\*

DATUM 94/10/19

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	522.21.211	2	164.11.113
3	522.21.250	4	522.21.213
5	522.21.214	6	522.21.311
7	164.10.206	8	164.11.121
9	166.60.012	10	164.11.114
12	164.21.002	13	169.51.000
14	166.35.189	15	522.21.212
16	166.67.005	17	161.83.065
18	522.21.521	19	522.21.200
20	163.61.050	21	168.00.079

## Assembly and adjustment directions

### A. In general

#### 1. Cleaning of the blades pos. 19

- Blow away the dust with compressed air or wipe with a soft dry cloth.
- Wipe the more sticking residue with a soft cloth:
  - Wet with spirit, if the surfaces are free of grease
  - Wet with toluol acetone, if the surfaces show traces of greaseClean the surface (by moving in large cercles) without pressure.  
Do not rub dry (formation of smears), but let dry on air.

#### 2. Cleaning of the guide plate

Wipe the guide plates with a dry cloth. Use spirit only in tenacious cases, toluol acetone is not admissible.

#### 3. Lubricating of the blade bearing

After cleaning the blades pos. 19 lubricate slightly the blade bearing again before remounting.

No grease must be outside the front ring areas at the blade bearing. Also slightly lubricate the bearing pin on the carrier plate (no grease in the thread!)

#### 4. Assembling sequence

Do not mix up the blades pos. 19 and the guide plates as well as the gears when mounting them.  
When re-mounting please follow the disassembling sequence exactly from behind.

#### 5. Attention!

Never press on the mounted blades as the guide plates will thereby be deformed. If necessary loose all 6 screws pos. 16 as far as the guide plates can release again automatically.



**B. Assembly respectively adjustment directions****1. Stepping motors pos. 04 respectively pos. 05**

- Stepping motor 1 pos. 04 moves blade 1.
- Stepping motor 2 pos. 05 moves blade 2.
- Stepping motors can be swung out on the ground plate so that the gears Pos. 06 do no more move into the gearing of blades

**1a. Adjustment of the stepping motors pos. 04 and pos. 05 ~~109.05.659~~**

- Tighten the screw pos. 08 in such manner that the stepping motor does not shake.
- Push the gear onto the motor shaft. Threaded pins pos. 20 directed against end of shaft
- Swing the motor to provoke the meshing between the gear and the gearing of the blades with ~~109.05.659~~. Control the resulting backlash between gear cutting of the blade and driving toothed wheel during a full turn of the blade.  
Toothed wheel must not exercise any radial force on the blade. Possibly correct the adjustment.
- Fix screws pos 07 and pos 08
- Check adjustment and correct, if necessary
- Secure pos. 07.

When swinging the stepping motors pos. 04 and pos. 05 the gears pos. 06 press on the blades pos. 19. It follows from that:

- a loud operational noise level with rattling
- possibly blocking of the stepping motors.

**1b. Adjustment of the gears pos. 06 between the guide plates**

- Place upright the ground plate as sketched.
- Adjust the gear optimally with the finger on the motor shaft by slightly axial displacement between the guide plates. Fix pos. 20 twice with threaded pins.
- Control whether the gear does not press on one side on one of the plates.
- Lock the threaded pins pos. 20.

If the axial position of the gears between the guide plates is not optimal, it follows

- a hissing, rattling and possibly whistling operational noise level
- possibly escape of the gears pos. 06 from the gearing of blades

## 2. Aperture driving ring pos. 01

- The aperture driving ring can be mounted respectively dismantled so that it will not be hampered by the processor print pos. 03.
- Push back aperture motor plate pos. 15 until spiral comes out.
- Turn the aperture driving ring anticlockwise as far as possible against the aperture motor
- After elimination of the guide ring the aperture driving ring can be lift off in axial direction.
- Place the spiral to the aperture driving ring in such manner that the radial play of the aperture driving ring in the guide ring keeps up.

If the spiral (pos. 15) is pressed too strongly on the aperture driving ring (pos. 01) it follows:

- loud, irregular operational noise of the motor
- transmission of the noise to the carrier plate (vibrations)

## Assembly and adjustment directions

### A. In general

#### 1. Cleaning of the blades pos. 19

- Blow away the dust with compressed air or wipe with a soft dry cloth.
- Wipe the more sticking residue with a soft cloth:
  - Wet with spirit, if the surfaces are free of grease
  - Wet with toluol acetone, if the surfaces show traces of greaseClean the surface (by moving in large cercles) without pressure.  
Do not rub dry (formation of smears), but let dry on air.

#### 2. Cleaning of the guide plate

Wipe the guide plates with a dry cloth. Use spirit only in tenacious cases, toluol acetone is not admissible.

#### 3. Lubricating of the blade bearing

After cleaning the blades pos. 19 lubricate slightly the blade bearing again before remounting.  
No grease must be outside the front ring areas at the blade bearing.  
Also slightly lubricate the bearing pin on the carrier plate (no grease in the thread!)

#### 4. Assembling sequence

Do not mix up the blades pos. 19 and the guide plates as well as the gears when mounting them.  
When re-mounting please follow the disassembling sequence exactly from behind.

#### 5. Attention!

Never press on the mounted blades as the guide plates will thereby be deformed. If necessary loose all 6 screws pos. 16 as far as the guide plates can release again automatically.

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## B. Assembly respectively adjustment directions

### 1. Stepping motors pos. 04 respectively pos. 05

- Stepping motor 1 pos. 04 moves blade 1.
- Stepping motor 2 pos. 05 moves blade 2.
- Stepping motors can be swung out on the ground plate so that the gears Pos. 06 do no more move into the gearing of blades

#### 1a. Adjustment of the stepping motors pos. 04 and pos. 05

- Tighten the screw pos. 08 in such manner that the stepping motor does not shake.
- Push the gear onto the motor shaft. Threaded pins pos. 20 directed against end of shaft
- Swing the motor to provoke the meshing between the gear and the gearing of the blades. Adjust the toothed wheel carefully on the blade, so that the smallest resulting backlash during a full turn of the blade will be between 0.05 and 0.1 mm.
- Fix screws pos 07 and pos 08
- Check adjustment and correct, if necessary
- Secure pos. 07.

When swinging the stepping motors pos. 04 and pos. 05 the gears pos. 06 press on the blades pos. 19. It follows from that:

- a loud operational noise level with rattling
- possibly blocking of the stepping motors.

#### 1b. Adjustment of the gears pos. 06 between the guide plates

- Place upright the ground plate as sketched.
- Adjust the gear optimally with the finger on the motor shaft by slightly axial displacement between the guide plates. Fix pos. 20 twice with threaded pins.
- Control whether the gear does not press on one side on one of the plates.
- Lock the threaded pins pos. 20.

If the axial position of the gears between the guide plates is not optimal, it follows

- a hissing, rattling and possibly whistling operational noise level
- possibly escape of the gears pos. 06 from the gearing of blades

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## 2. Aperture driving ring pos. 01

- The aperture driving ring can be mounted respectively dismantled so that it will not be hampered by the processor print pos. 03.
- Push back aperture motor plate pos. 15 until spiral comes out.
- Turn the aperture driving ring anticlockwise as far as possible against the aperture motor
- After elimination of the guide ring the aperture driving ring can be lift off in axial direction.
- Place the spiral to the aperture driving ring in such manner that the radial play of the aperture driving ring in the guide ring keeps up.

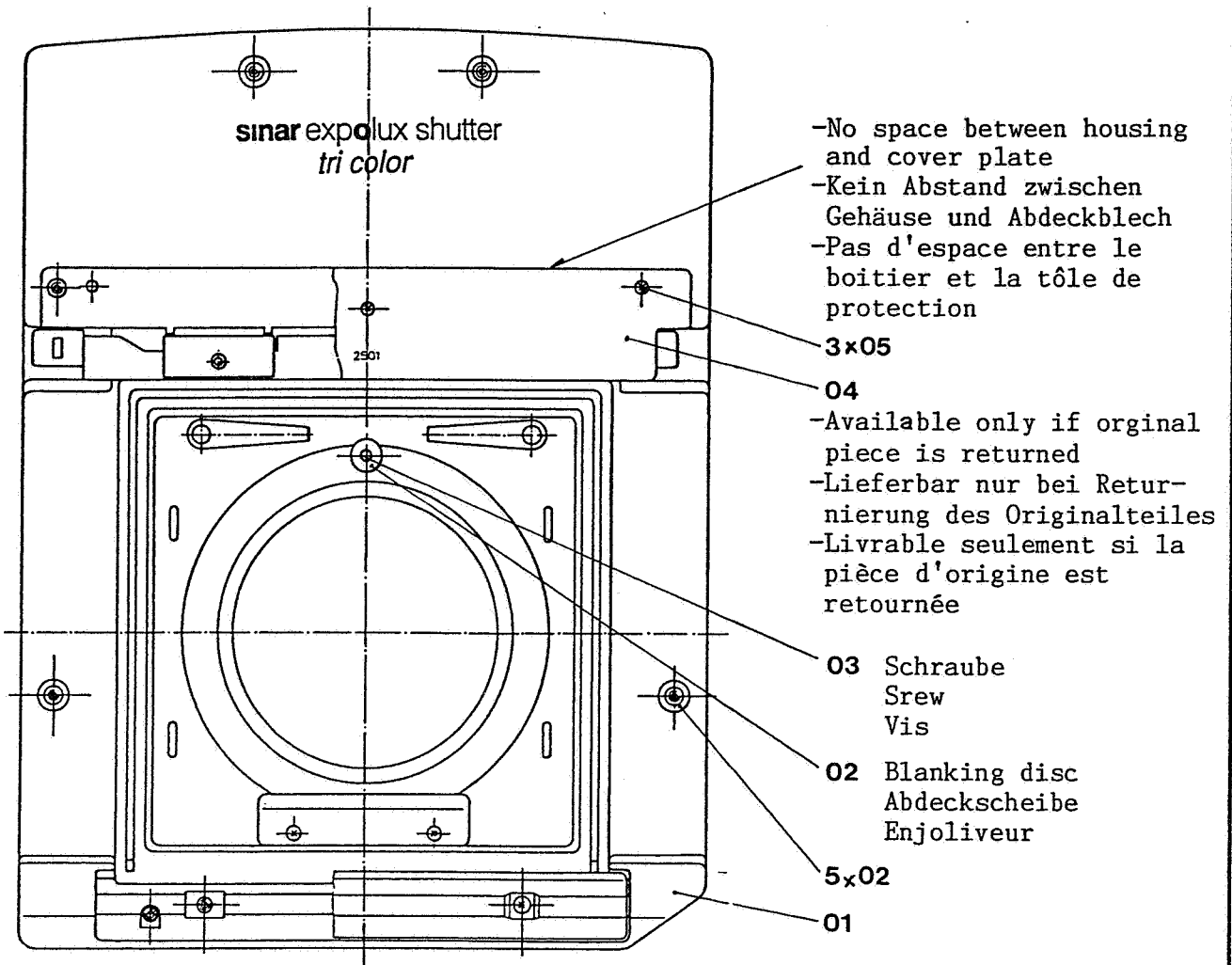
If the spiral (pos. 15) is pressed too strongly on the aperture driving ring (pos. 01) it follows:

- loud, irregular operational noise of the motor
- transmission of the noise to the carrier plate (vibrations)

Please note that there is a pressure spring (pos.21 on sheet 0909-7) between the back part of the housing (pos.01) and the base plate according to service sheet no. 0909-7, which may not be forgotten when assembling the shutter.

Bitte beachten Sie, dass sich zwischen Gehäuserückteil Pos.01 und der Grundplatte gem. Serviceblatt 0909-7 eine Druckfeder befindet, (Pos.21 auf Blatt 0909-7) welche beim Zusammenbauen des Verschlusses nicht vergessen werden darf.

Veillez remarquer qu'un ressort de pression (pos.21 sur feuille de service 0909-7) se trouve entre le dos du boitier pos.01 et la plaque de base selon feuille de service 0909-7. Elle ne doit pas être oubliée lors du réassemblage de l'obturateur.



-No space between housing and cover plate  
-Kein Abstand zwischen Gehäuse und Abdeckblech  
-Pas d'espace entre le boitier et la tôle de protection

3x05

04

-Available only if original piece is returned  
-Lieferbar nur bei Returrierung des Originalteiles  
-Livrable seulement si la pièce d'origine est retournée

03 Schraube  
Srew  
Vis

02 Blanking disc  
Abdeckscheibe  
Enjoliveur

5x02

01

Adjust after disassembling with  
Positionieren nach Demontage  
Ajuster après démontage avec } 109.05.654

**Spare parts - Ersatzteile - Pièces de rechange**

Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange	Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange
01	522.21.102	02	522.21.527
03	161.83.055	04	522.21.489
05	164.11.096		

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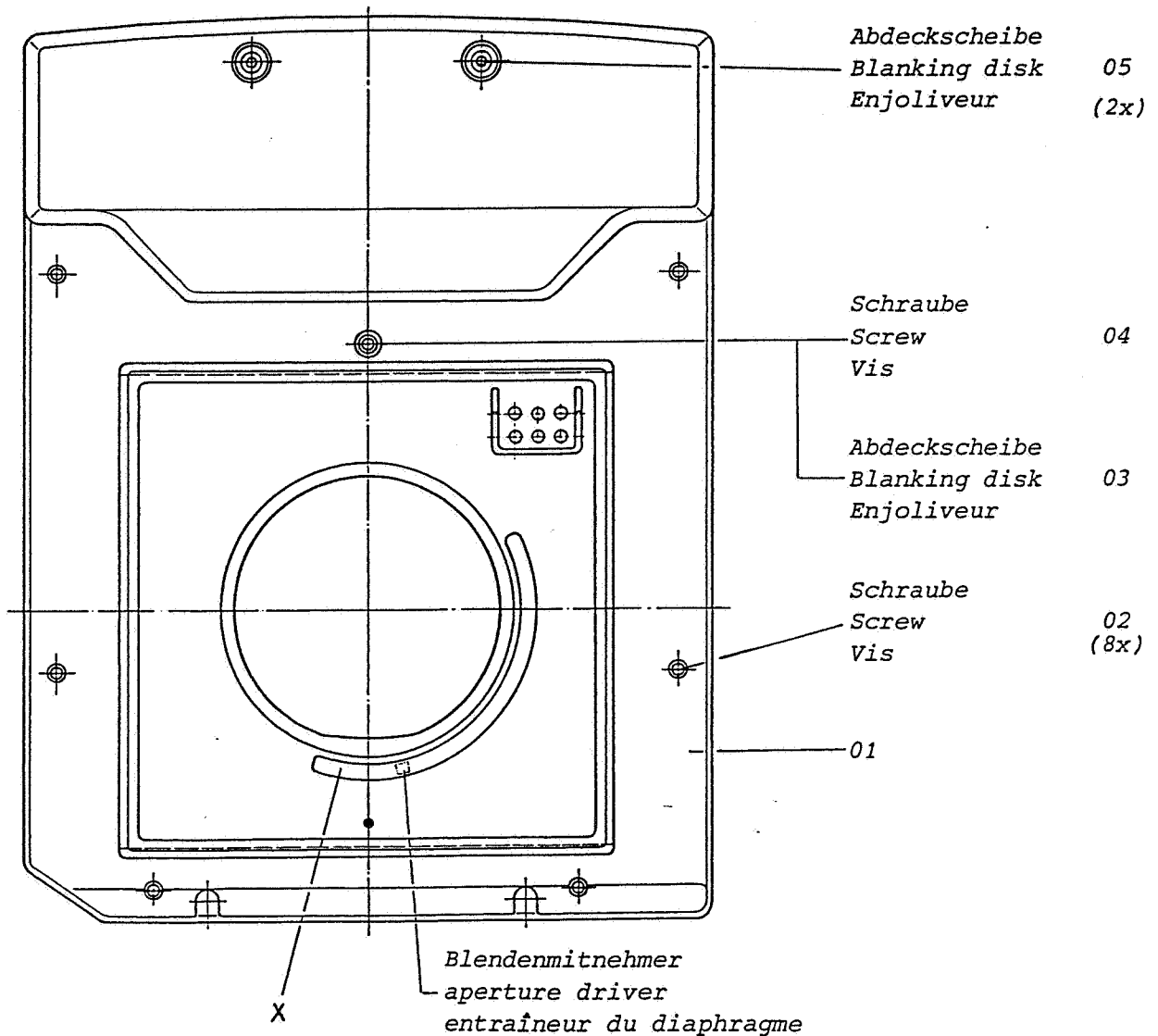
522.21.020

Vor Aufsetzen des Gehäusevorderteiles Pos. 01 Blendenmitnehmer (Blendenantriebsring Pos 01 auf Serviceblatt 0909-7) innerhalb der Oeffnung "X" positionieren, da sonst Kollision mit Gehäuse.

Before mounting the front housing pos 01 position aperture driver (aperture driving ring pos 01 on service sheet 0909-7) inside of the aperture "X" since otherwise collision with pos.01.

Positionner l'entraîneur du diaphragme (bague d'entraînement de diaphragme pos. 01 sur la feuille de service 0909-7) à l'intérieur de l'ouverture "X" avant le montage du devant du boîtier pos. 01 afin d'éviter la collision avec pos. 01.

Pos. 02: Anziehdrehmoment initial torque 35-40 Ncm  
couple de serrage



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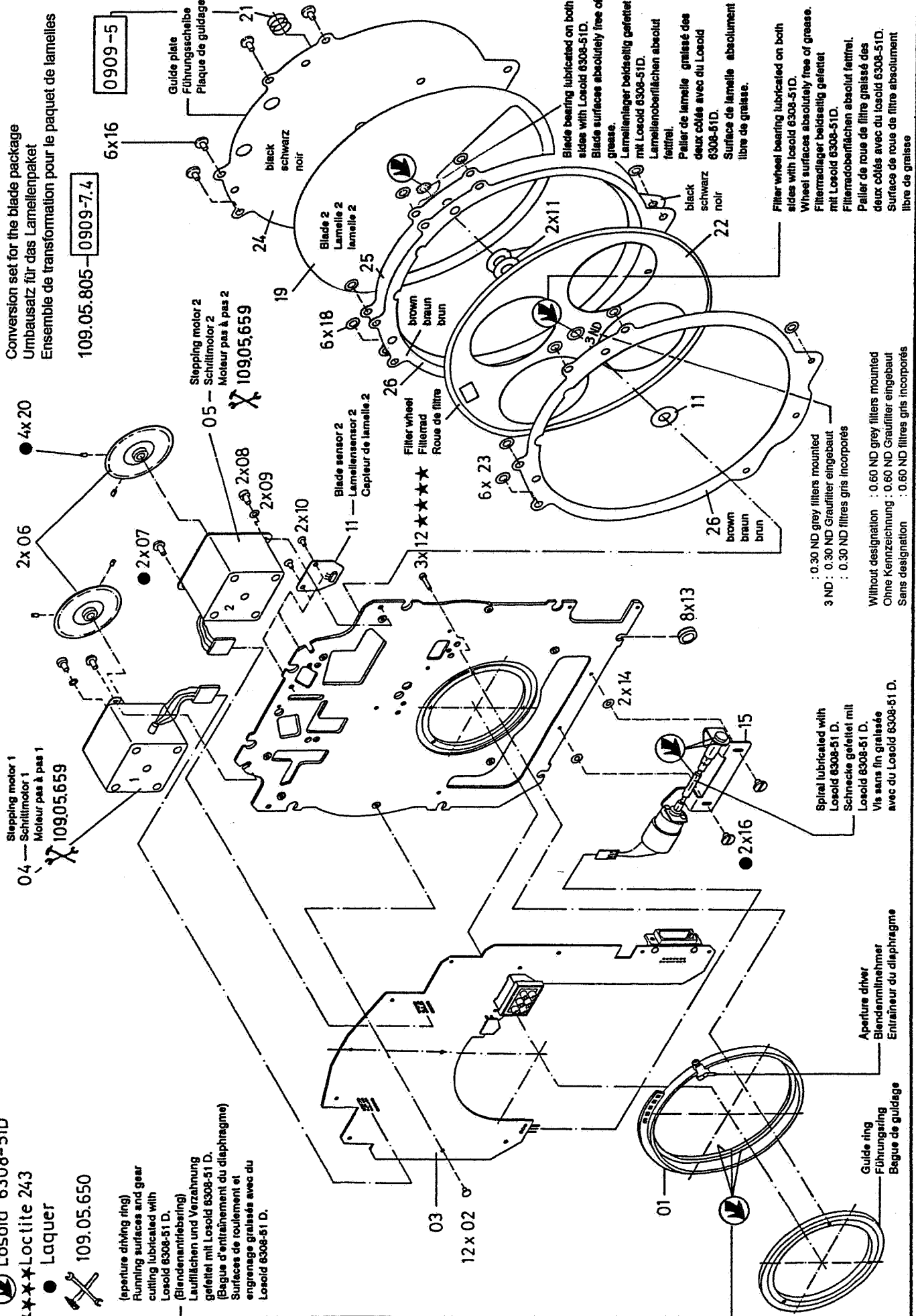
### Spare parts - Ersatzteile - Pièces de rechange

Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange	Fig No.	Part No. Ersatzteil Nr. No. pièce de rechange
01	522.21.401	02	164.11.106
03	522.21.527	04	164.11.116
05	433.67.519		

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Losoid 6308-51D  
Loctite 243  
Laquer  
109.05.650

(aperture driving ring)  
Running surfaces and gear cutting lubricated with Losoid 6308-51 D.  
(Blendenantriebsring)  
Laufflächen und Verzahnung gefettet mit Losoid 6308-51 D.  
(Bague d'entraînement du diaphragme)  
Surfaces de roulement et engrenage graissés avec du Losoid 6308-51 D.



Conversion set for the blade package  
Umbausatz für das Lamellenpaket  
Ensemble de transformation pour le paquet de lamelles

109.05.805-0909-7.4

Blade bearing lubricated on both sides with Losoid 6308-51D.  
Blade surfaces absolutely free of grease.  
Lamellenlager beidseitig gefettet mit Losoid 6308-51D.  
Lamellenoberflächen absolut fettfrei.  
Pilier de lamelle graissé des deux côtés avec du Losoid 6308-51D.  
Surface de lamelle absolument libre de graisse.

Filter wheel bearing lubricated on both sides with Losoid 6308-51D.  
Wheel surfaces absolutely free of grease.  
Filterradlager beidseitig gefettet mit Losoid 6308-51D.  
Filterradoberflächen absolut fettfrei.  
Pilier de roue de filtre graissé des deux côtés avec du Losoid 6308-51D.  
Surface de roue de filtre absolument libre de graisse.

3 ND : 0.30 ND grey filters mounted  
0.30 ND Graufilter eingebaut  
Sans designation : 0.30 ND filtres gris incorporés

Without designation : 0.60 ND grey filters mounted  
Ohne Kennzeichnung : 0.60 ND Graufilter eingebaut  
Sans designation : 0.60 ND filtres gris incorporés

Spiral lubricated with Losoid 6308-51 D.  
Schnecke gefettet mit Losoid 6308-51 D.  
Vis sans fin graissée avec du Losoid 6308-51 D.



SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0909-7

\*\*\*\*\*

DATUM 94/11/23

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	522.21.211	2	164.11.113
3	522.21.250	4	522.21.213
5	522.21.214	6	522.21.311
7	164.10.206	8	164.11.121
9	166.60.012	10	164.11.114
11	166.30.131	12	164.21.002
13	169.51.000	14	166.35.189
15	522.21.212	16	166.67.005
18	522.21.521	19	522.21.200
20	163.61.050	21	168.00.079
22	522.21.222	23	522.21.522
24	522.21.393	25	522.21.491
26	522.21.492		

## Assembly and adjustment directions

### A. In general

#### 1a. Cleaning of the blade pos. 19

- Blow away the dust with compressed air or wipe with a soft dry cloth.
- Wipe the more sticking residue with a soft cloth:
  - Wet with spirit if the surfaces are free of grease
  - Wet with clean benzine if the surfaces show traces of grease. Clean the surface (by moving in large circles) without pressure. Do not rub dry (formation of smears) but let dry on air.

#### 1b. Cleaning of the filter wheel pos. 22

Do not touch the filter, do not wipe off and keep absolutely dry and fat free.

##### Important instructions:

Short-term and/or partial effect of warmth and/or humidity, for example after breathing or blowing away of dust from the filter surfaces strong changes of dimension at the gelatine filters are caused. The filters curve more or less strongly.

In such a case the shutter must not be run as long as the curves have not shrunk completely. If this hint is ignored the filter surfaces could get damaged.

#### 2. Cleaning of the guide plates

Wipe the guide plates with a dry cloth. Use spirit only in tenacious cases, toluene acetone is not admissible.

#### 3. Lubricating of the blade and filter wheel bearing and of the filter wheel pos. 22

After cleaning the blades pos. 19 lubricate slightly the blade bearing again before remounting.

No grease must be outside the front ring areas at the blade bearing. Also slightly lubricate the bearing pin on the carrier plate (no grease in the thread!)

#### 4. Assembling sequence

Do not mix up the blade pos. 19, filter wheel pos. 22 and the guide plates as well as the gears when mounting them.

When remounting please follow the disassembling sequence exactly from behind.


#### 5. Attention!

Never press on the mounted blades as the guide plates will thereby be deformed. If necessary loose all 6 screws pos. 16 as far as the guide plates can release again automatically.

**B. Assembly respectively adjustment directions****1. Stepping motors pos. 04 respectively pos. 05**

- Stepping motor 1 pos. 04 moves filter wheel pos. 22.
- Stepping motor 2 pos. 05 moves blade 2.
- Stepping motors can be swung out on the ground plate so that the gears Pos. 06 do no more move into the gearings.

**1a. Adjustment of the stepping motors pos. 04 and pos. 05  109.05.659**

- Tighten the screw pos. 08 in such manner that the stepping motor does not shake.
- Push the gear onto the motor shaft. Threaded pins pos. 20 directed against end of shaft
- Swing the motor to provoke the meshing between the gear and the gearing of the blades respectively filter wheel gearing with  109.05.659. Control the resulting backlash between gear cutting of the blade and driving toothed wheel during a full turn of the blade. Toothed wheel must not exercise any radial force on the blade. Possibly correct the adjustment.
- Fix screws pos 07 and pos 08
- Check adjustment and correct, if necessary
- Secure pos. 07.

When swinging the stepping motors pos. 04 and pos. 05 the gears pos. 06 press on the blade pos. 19 respectively filter wheel pos. 22. It follows from that:

- a loud operational noise level with rattling
- possibly blocking of the stepping motors.

**1b. Adjustment of the gears pos. 06 between the guide plates**

- Place upright the ground plate as sketched.
- Adjust the gear optimally with the finger on the motor shaft by slightly axial displacement between the guide plates. Fix pos. 20 twice with threaded pins.
- Control whether the gear does not press on one side on one of the plates.
- Lock the threaded pins pos. 20.

If the axial position of the gears between the guide plates is not optimal, it follows

- a hissing, rattling and possibly whistling operational noise level
- possibly escape of the gears pos. 06 from blades respectively filter wheel gearing.

## 2. Aperture driving ring pos. 01

- The aperture driving ring can be mounted respectively dismantled so that it will not be hampered by the processor print pos. 03.
- Push back aperture motor plate pos. 15 until spiral comes out.
- Turn the aperture driving ring anticlockwise as far as possible against the aperture motor
- After elimination of the guide ring the aperture driving ring can be lift off in axial direction.
- Place the spiral to the aperture driving ring in such manner that the radial play of the aperture driving ring in the guide ring keeps up.

If the spiral (pos. 15) is pressed too strongly on the aperture driving ring (pos. 01) it follows:

- loud, irregular operational noise of the motor
- transmission of the noise to the carrier plate (vibrations)

**Conversion set 109.05.805**

The assembly of the mounted blades of the Tricolor shutter has been modified.

The modification should reduce the problem of the filter scratches. Please observe hereto paragraph 1 b on the service sheet 0909-7.1.

The conversion set 109.05.805 **only** serves to the modification of the mounted blades of the Expolux - shutter Tricolor up to the actual state. This can be seen on the service sheet 0909-7, as from the date of edition 12.94.

**The conversion set 109.05.805 must not, in any case, be used to modify an Expolux - shutter to an Expolux - Tricolor - shutter. The Tricolor - shutter manufactured in this way will not function properly!**

In general all Tricolor shutters passing the service stations should be brought up to date.

The positions needed for the modification are contained in the conversion set 109.05.805.

**Attention**

The spring-loaded compensation disks 163.81.065 (6x), under the screws Pos. 16, will no more be needed in the mounted blades!

Please return the exchanged parts to SINAR. You will then receive a credit note.

**Positions of the conversion set 109.05.805**

522.21.102	Housing back part (machined)	1x	without cover plate 522.21.389 with engraved serial number
522.21.401	Housing front part (machined)	1x	
522.21.527	Cover disk	2x	
433.67.519	Cover disk	2x	
522.21.393	Guide disk	1x	
522.21.491	Guide ring	1x	
522.21.492	Guide ring	2x	
166.30.131	Washer	3x	

**Parts replaced by conversion set 109.05.805 to be returned to SINAR**

522.21.102	Housing back part	1x	without cover plate 522.21.389 with engraved serial number
522.21.301	Housing front part	1x	
522.21.392	Guide disk	2x	
522.21.391	Guide disk	1x	
163.81.065	Compensation disk	6x	

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## Authorized repairs on the Expolux Monitor

The service performance being practicable is limited to the replacement of the components which are specified in the part lists and the respective disassembling and assembling of the device itself.

- No soldering to be done

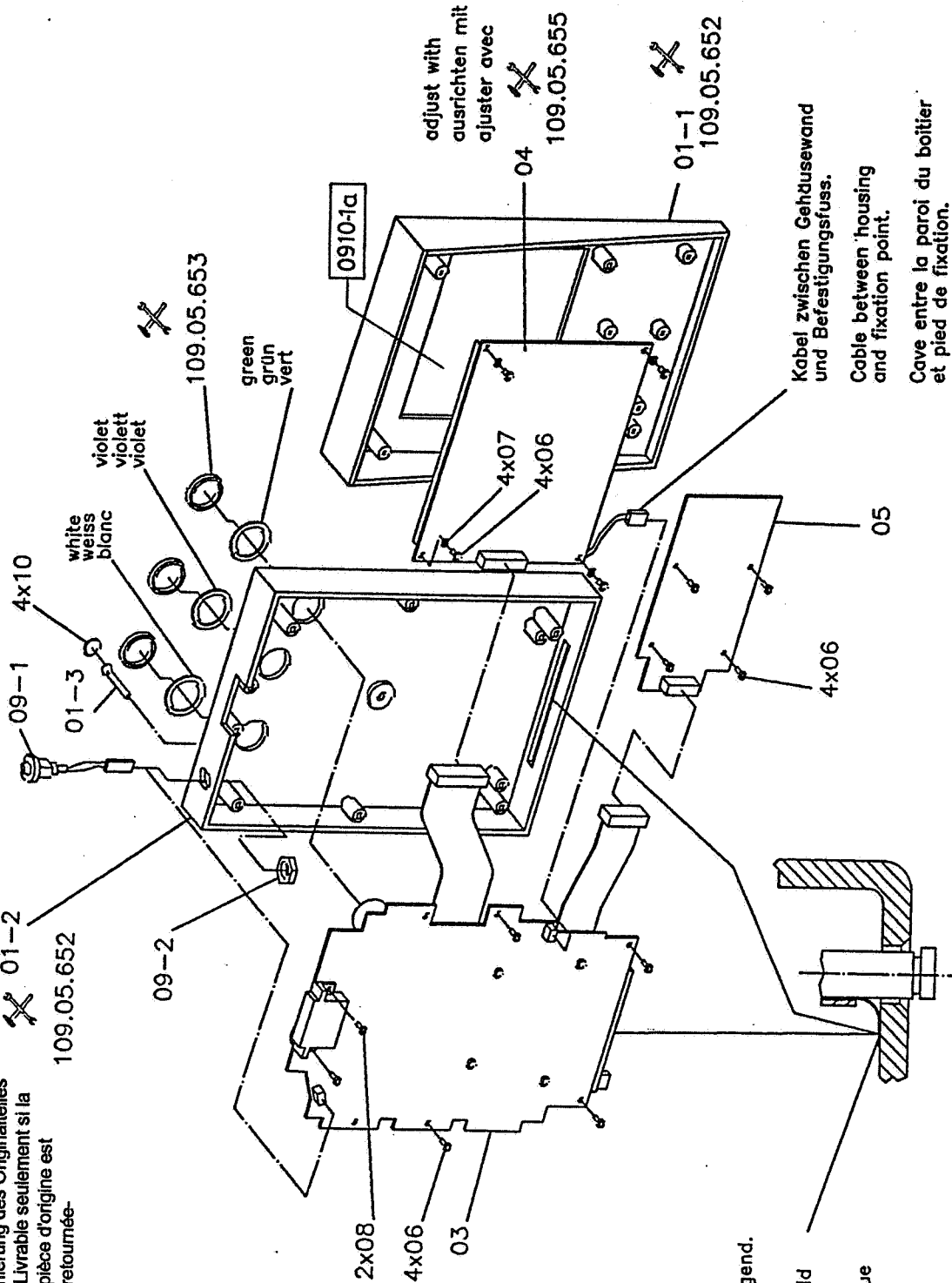
In this connection, please do note the warranty conditions on page 21 of the instruction manual of the Sinar Expolux system.

A self test program is integrated in the Expolux monitor.

- Connect all Expolux system components on the monitor before starting up.
- Switch on monitor without memory card. The Sinar Expolux title picture "Show system info" will show with a "?".
- Insert memory card.
- Immediately after re-appearance of the title picture, push ESC-key to start the test program.
- Follow instructions for program sequence.
- If there is a fault, the test program will stop at that point.
- If test program is successfully terminated, leave with the OK-key.
- Further information about the condition of the Expolux monitor are shown with menu "show system info".

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-Available only if original  
 -piece is returned  
 -Lieferbar nur bei Rück-  
 -lieferung des Originalteiles  
 -Livrabie seulement si la  
 -pièce d'origine est  
 -retournée-



adjust with  
 ausrichten mit  
 ajuster avec  
 109.05.655

01-1  
 109.05.652

Kabel zwischen Gehäusewand  
 und Befestigungsfuss.  
 Cable between housing  
 and fixation point.  
 Cave entre la paroi du boîtier  
 et pied de fixation.

Kunststoff-Folie an  
 Gehäuse-Innenwand  
 anliegend, nicht in  
 Gehäuseöffnung hineinragend.

Plastic foil on the inner  
 wall of the housing should  
 not extend into the slot.

Feuille en matière plastique  
 adhérente à la paroi  
 intérieure du boîtier,  
 l'ouvrerture du boîtier.

SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0910-1

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DATUM 94/10/19

INDEX 0

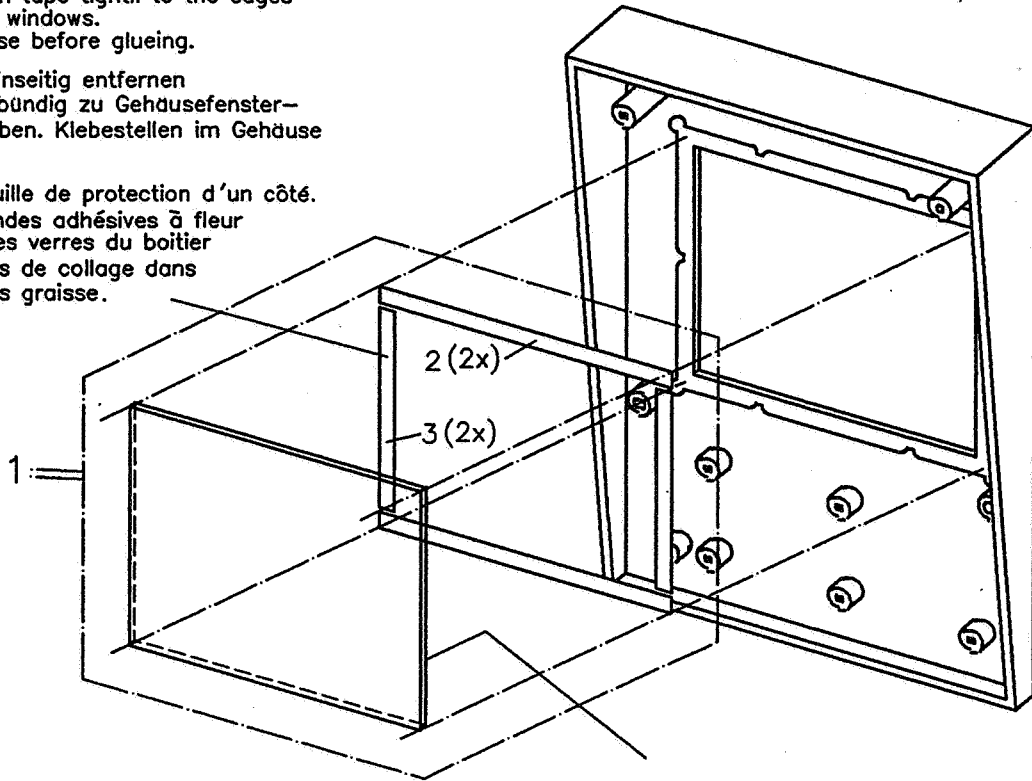
POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	522.21.230	3	522.21.160
4	522.21.261	5	522.21.262
6	164.91.046	7	166.30.075
8	164.91.047	9	522.21.236
10	522.21.560		



Remove protection foil on side.  
Glue in scotch tape tightly to the edges  
of the house windows.  
Remove grease before glueing.

Schutzfolie einseitig entfernen  
Klebebänder bündig zu Gehäusefenster-  
kanten einkleben. Klebestellen im Gehäuse  
fettfrei.

Enlever la feuille de protection d'un côté.  
Coller les bandes adhésives à fleur  
des arêtes des verres du boîtier  
Emplacements de collage dans  
le boîtier sans graisse.



Filter glass glued in place. Structural side = glue side.  
Filterscheibe eingeklebt. Strukturseite = Klebeseite  
Verre de filtre collé. Côté de structure = côté collé

**Replacement of the filter glass**

The filter glass is only then replaceable by set pos.1, when the filter glass to be replaced has also been stuck in with the white adhesive tapes pos.3 and pos.4. If the filter glass to be replaced with transparent adhesive is stuck in respectively one of the two half of the housings is damaged, the housing set pos.1 has to be procured according to the service sheet 0910-1.

**Ersetzen der Filterscheibe**

Die Filterscheibe ist nur dann ersetzbar durch Set Pos.1, wenn die zu ersetzende Filterscheibe ebenfalls mit den weissen Klebebändern Pos.3 und Pos.4 eingeklebt wurde. Ist die zu ersetzende Filterscheibe mit transparentem Klebstoff eingeklebt, resp. eines der beiden Gehäusehälften beschädigt, muss das Gehäuseset Pos.1 gem. Serviceblatt 0910-1 bezogen werden.

**Remplacement du disque de filtre**

Le disque de filtre n'est qu'à remplacer par set pos.2 quand le disque de filtre à remplacer avait aussi été collé avec les rubans adhésifs blancs pos.3 et pos.4. Si le disque de filtre à remplacer est collé avec de la colle transparente respectivement une des deux moitiés de boîtiers est endommagé, le set de boîtier pos.1 doit être procuré selon la feuille de service 0910-1.

**SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE**

S0910-1A

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DATUM 94/10/05

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	109.05.804	2	522.21.395
3	522.21.396		

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522.21.040

### Zulässige Arbeiten Expolux Speisegerät

Die ausführbaren Servicearbeiten beschränken sich auf den Ersatz der in den Partlists aufgeführten Komponenten, und der damit verbundenen Demontage- resp. Montagearbeiten am Gerät selbst.

- Keine Lötarbeiten vornehmen

Beachten Sie in diesem Zusammenhang die Gewährleistungs-Bestimmungen auf Seite 21 der Gebrauchsanleitung für das Sinar Expolux System.

### Authorized repairs on the Expolux Power Supply

The service performance being practicable is limited to the replacement of the components which are specified in the part lists and the respective disassembling and assembling of the device itself.

- No soldering

In this connection, please do note the warranty conditions on page 21 of the instruction manual of the Sinar Expolux system.

### Réparations autorisées sur l'alimentation Expolux

Les travaux de service réalisables se limitent au remplacement des composants figurant dans les listes des pièces de rechange et aux travaux de démontage resp. de montage y respectifs sur l'appareil même.

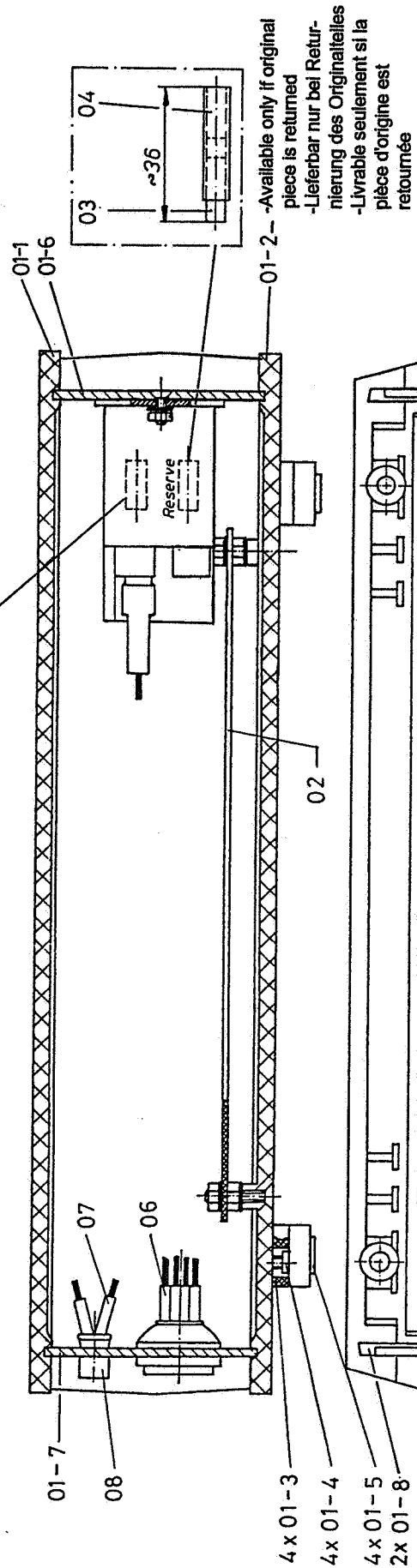
- Ne sonder nulle part

Veillez observer dans ce contexte les conditions de garantie à la page 21 du mode d'emploi pour le système Sinar Expolux.

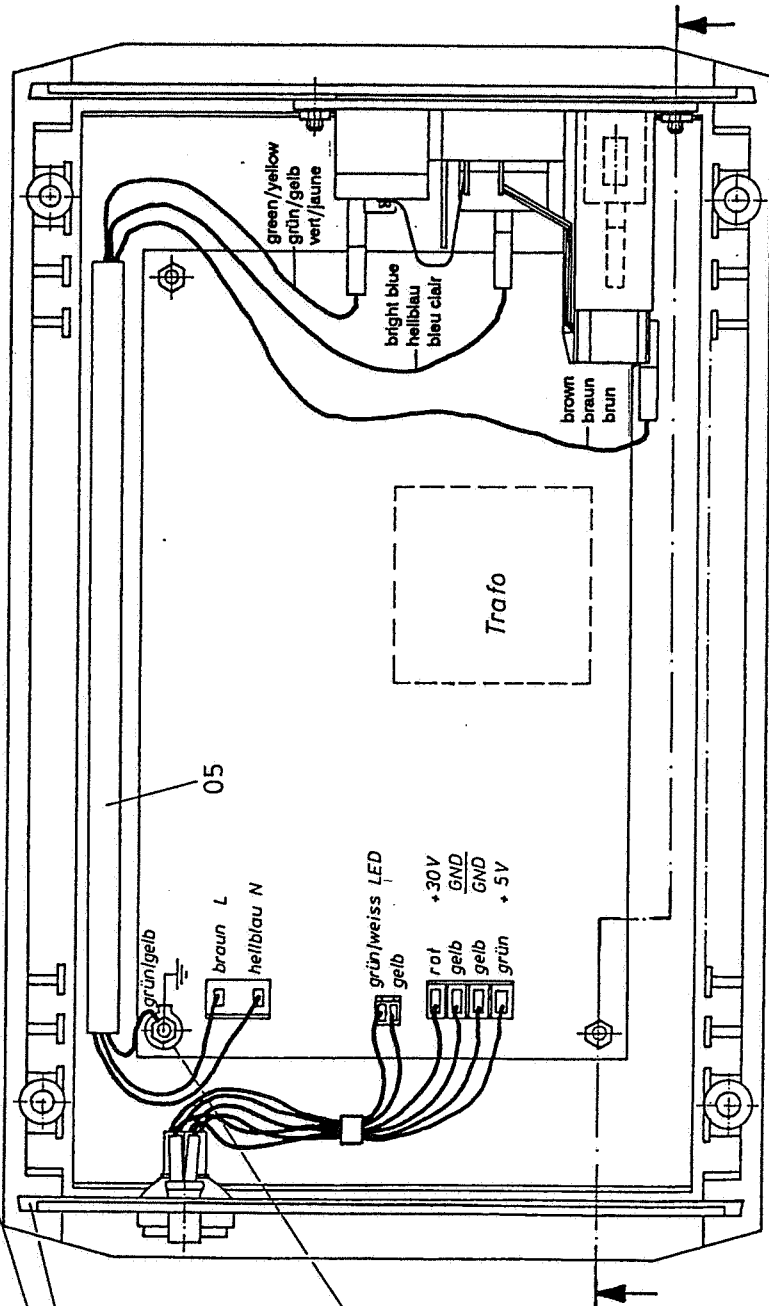
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03 T 2A H/250V (High breaking capacity)



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**Attention:** This device may only be opened by personnel authorized by SINAR!  
**Attention:** Cet appareil doit uniquement être ouvert par du personnel autorisé par SINAR!



Protection ground  
Schutzerde  
Mise à la terre de protection

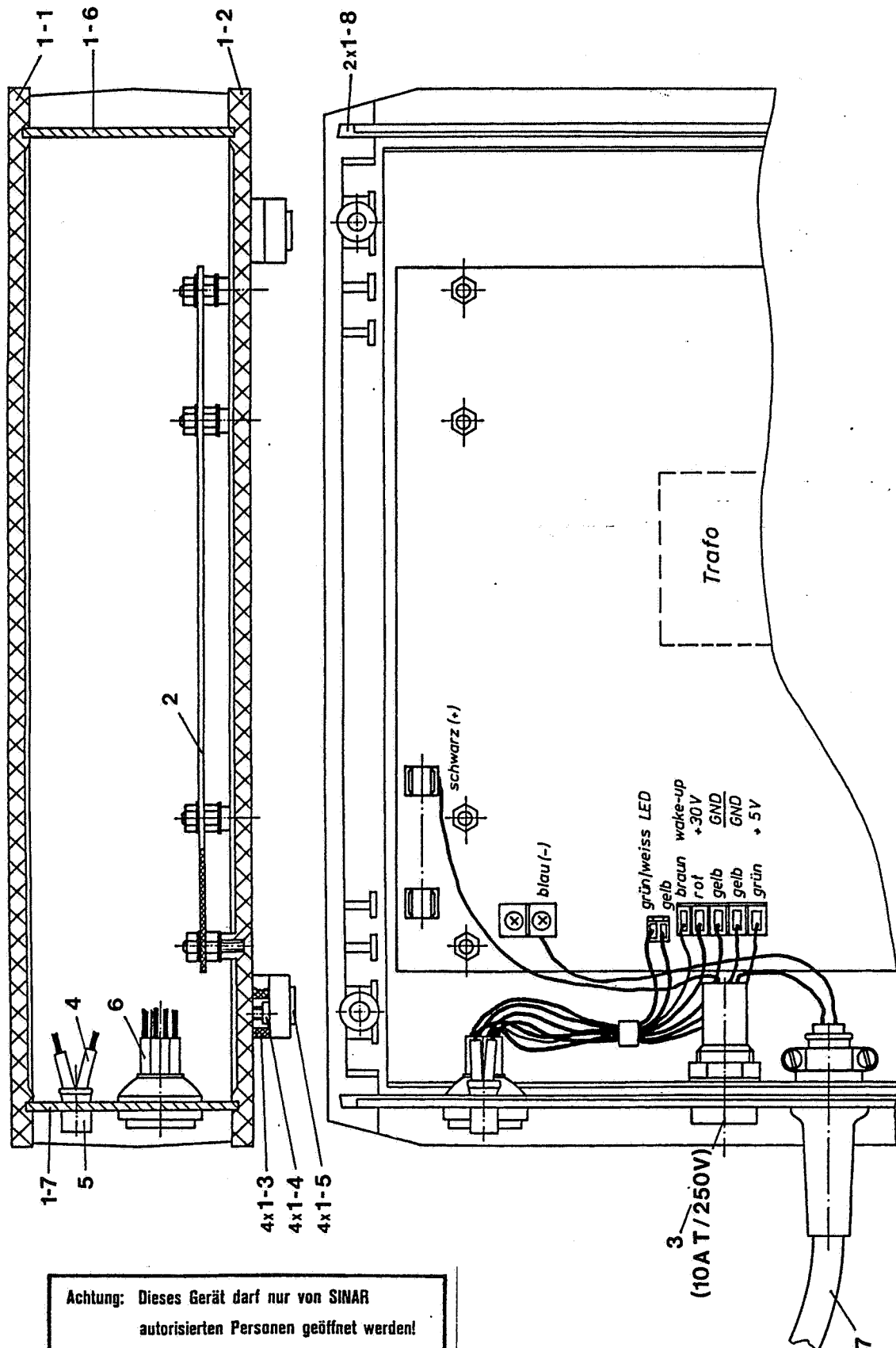
SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE  
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S0911-1

DATUM 93/06/29

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
1	522.21.240	2	172.12.001
3	173.90.065	4	179.24.003
5	522.21.247	6	522.21.248
7	522.21.249	8	177.01.810



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SPARE PARTS - ERSATZTEILE - PIECE DE RECHANGE

S0912-1

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DATUM 94/11/23

INDEX 0

POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE	POS	PART NO. ERSATZTEIL NR. PIECE DE RECHANGE
2	172.13.100	3	173.90.066
4	522.21.249	5	177.01.810
6	522.21.246	7	522.21.245

522.21.213

Stepping motor for shutter blade.

Adjust the mesh between the toothed driving wheel 551.33.529 and shutter blade 551.33.204 by swinging the stepping motor as far as the resulting backlash becomes very small.

Fix the toothed driving wheel 551.33.529 onto the stepping motor shaft by tightening the threaded pins 163.61.050.

Secure the threaded pins with black laquer.

Tighten screws 163.91.084 for stepping motor and secure them with black laquer.

Handle the plug through the diagonal slit in the base plate.

Connection pins for shutter blade

sensor print plug.

166.60.012 2x

163.91.084 2x

166.31.089 2x

163.91.084 2x

0920-4

Processor Print

551.33.529 2x

Toothed driving wheel

163.61.050 4x

551.33.513 4x

Base plate

Connection pins for shutter blade stepping motor 551.33.213

164.11.114 11x

522.21.214

Stepping motor for filter wheel.

Adjust the mesh between the toothed driving wheel 551.33.529 and filter wheel 551.33.213 by swinging the stepping motor as far as the resulting backlash becomes small.

Fix the toothed driving wheel 551.33.529 onto the stepping motor shaft by tightening the threaded pins 163.61.050.

Secure the threaded pins with black laquer.

Now readjust the mesh by swinging the stepping motor slightly as far as the resulting backlash becomes zero.

Tighten screws 163.91.084 for stepping motor and secure them with black laquer.

Handle the plug through the diagonal slit in the base plate.

551.33.528 2x

Burr from punching towards the guide ring surface.

522.21.521 2x

551.33.507

Guide ring

Glossy surface towards the shutter blade surface.

551.33.204

Shutter blade

522.21.521 6x

551.33.508

Guide ring

Glossy surface towards the shutter blade surface.

551.33.213

Filter wheel

551.33.517 4x

551.33.507

Guide ring

Glossy surface towards the filter wheel surface.

169.51.000 6x

Take care of the contact springs. Check clearance between contact springs and base plate surface of 3.1+/-0.2mm.

Shutter blade sensor print

Take care of correct connection between plug and connecting pins on the processor print. Handle the plug through the horizontal slit in the base plate.

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- \*\*\*\* Loctite 243
- Black laquer
- ☉ Losoid 6308-51D
- ✂ Assembling plate Sinarcam 109.05.675
- ✂ Control Unit 109.05.686

**522.21.213**

Stepping motor for shutter blade.

Adjust the mesh between the toothed driving wheel 551.33.529 and shutter blade 551.33.204 by swinging the stepping motor as far as the resulting backlash becomes very small.

Fix the toothed driving wheel 551.33.529 onto the stepping motor shaft by tightening the threaded pins 163.61.050.

Secure the threaded pins with black laquer.

Tighten screws 163.91.084 for stepping

motor and secure them with black laquer.

Handle the plug through the diagonal

slit in the base plate.

Connection pins  
for shutter blade  
sensor print plug.

166.60.012 2x

163.91.084 2x

166.31.089 2x

163.91.084 2x

0920-4

Processor Print

551.33.529 2x

Toothed driving wheel

163.61.050 4x

551.33.513 4x

Base plate

X5

X4

Connection pins  
for shutter blade  
stepping motor  
551.33.213

164.11.114

11x

**522.21.214**

Stepping motor for filter wheel.

Adjust the mesh between the toothed driving wheel 551.33.529 and filter wheel 551.33.213 by swinging the stepping motor as far as the resulting backlash becomes very small.

Fix the toothed driving wheel 551.33.529 onto the stepping motor shaft by tightening the threaded pins 163.61.050.

Secure the threaded pins with black laquer.

Now readjust the mesh by swinging

the stepping motor slightly as far as the resulting backlash becomes zero.

Tighten screws 163.91.084 for stepping

motor and secure them with black laquer.

Handle the plug through the diagonal

slit in the base plate.

551.33.528 2x

Burr from punching,  
towards the guide ring surface.

522.21.521 2x

Shutter blade sensor print

Take care of correct connection

between plug and connecting pins on the processor print.

Handle the plug through the horizontal  
slit in the base plate.

164.11.114 2x

166.67.065 6x

161.83.065 6x

551.33.507

Guide ring

Glossy surface towards  
the shutter blade surface.

551.33.204

Shutter blade

522.21.521 6x

551.33.508

Guide ring

Glossy surface towards  
the shutter blade surface.

551.33.213

Filter wheel

551.33.517 4x

551.33.507

Guide ring


Glossy surface towards  
the filter wheel surface.


Take care of the contact springs.  
Check clearance between contact springs and  
base plate surface of 3.1+/-0.2mm.

169.51.000 6x

\*\*\*\* Loctite 243

● Black laquer

 Losoid 6308-51D

 Assembling plate Sinarcam  
109.05.675

 Control Unit 109.05.686

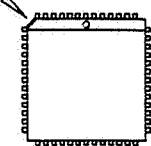


ESD-Safety measures in accordance with circular letter VZ 402  
(Service Manual No.3, Reg.18)

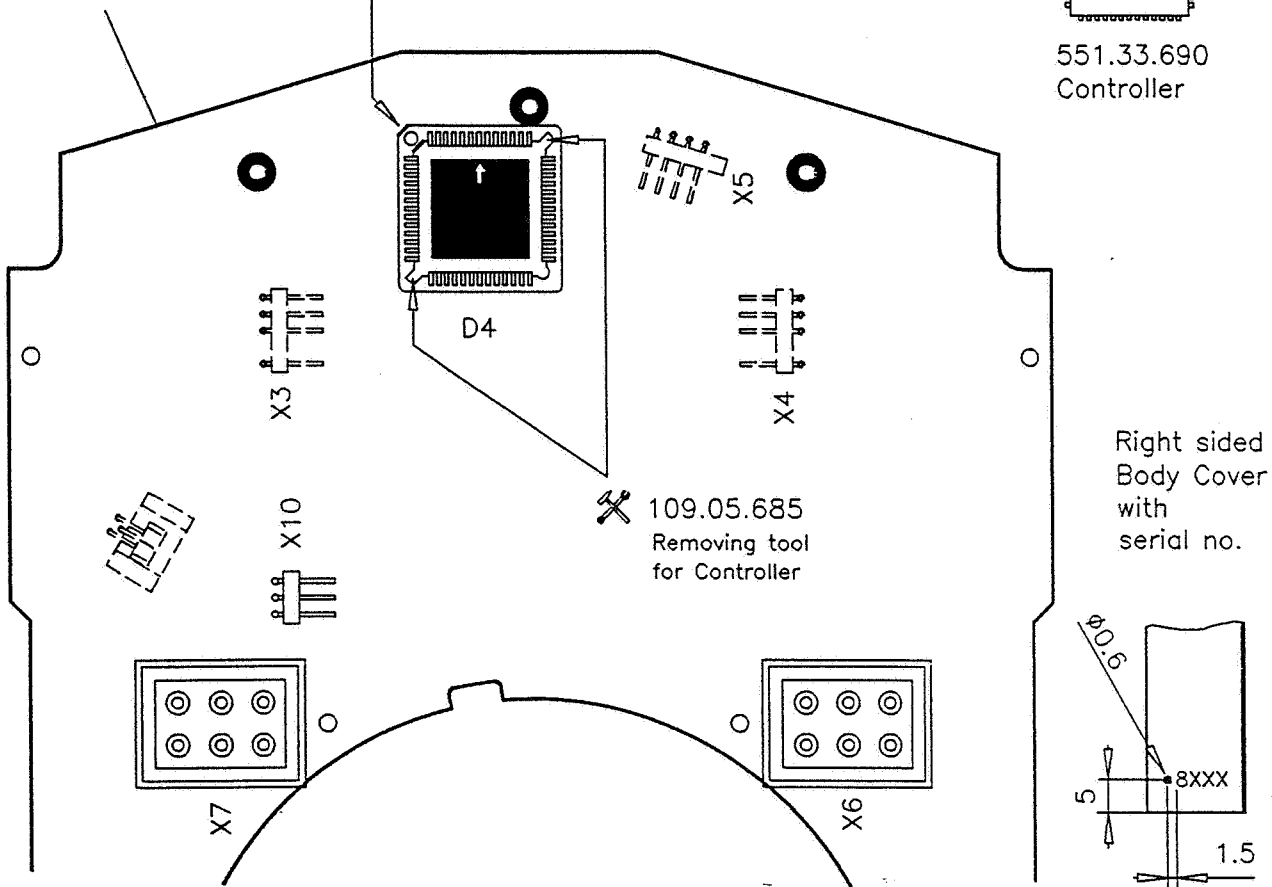
Position the Controller correctly in the socket.  
Push the Controller by steady pressing into  
the socket.

Attention:  
Do not bend the Print !!!

551.33.290  
Processor Print



551.33.690  
Controller



What has to be updated

Sinarcam serial number	up to 8194	from 8195 to 8295	as from 8296
Components to exchange	Processor Print 551.33.290		None
	Controller 551.33.690	Controller 551.33.690	
Marking the updated Sinarcam	engraved point $\varnothing 0.6$ to the left of the serial no.	engraved point $\varnothing 0.6$ to the left of the serial no.	engraved point ex works

What is to do in case of update

Service Station	Sinar
Reads out the data of the Controller which has to be exchanged by using the Viewer Software. Transmits the data to Sinar.	Reads back the transmitted data in a new programmed Controller. Delivers the updated components as ordered.

Please return the exchanged components to Sinar. You will then receive a credit note

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551.33.010

## A. In general

The general information on the cleaning process is listed in the service manual No.1, register No. 0.

### 1a. Cleaning of the shutter blade 551.33.204 (0920-3)

Blow away the dust with compressed air or wipe with a soft dry cloth.

Wipe the more sticking residue with a soft cloth:

- moisturized with ethanol if the surfaces are free of grease.
- moisturized with clean benzine if the surfaces show traces of grease.

Clean the surface (by moving in large circles) without pressure. Do not rub (formation of smears) but let it dry in the air.

### 1b. Cleaning of the filter wheel 551.33.203. (0920-3)

See instruction „Cleaning of Optical Elements Made of Glass or Plastic“ service manual No.1, register No. 0.

### 2. Cleaning of the guide plates 551.33.507 and 551.33.508 (0920-3)

Wipe the guide plates with a dry cloth. Do only use ethanol in tenacious cases. Other cleansing agents such as clean benzine, acetone or toluene acetone are not permitted.

### 3. Lubricating of the blade and filter wheel bearing and of the filter wheel

After cleaning the shutter blades slightly lubricate the bearing again before remounting.

No grease must be outside the front ring areas at the blade bearing. Also slightly lubricate the bearing pin on the carrier plate (no grease in the thread!).

### 4. Assembling sequence

Do not mix up the shutter blade, filter wheel and the guide plates as well as the gears when mounting them.

When remounting, please follow the disassembling sequence exactly in reverse sequence.

### 5. Attention!

Never press on the mounted blades as the guide plates will thereby be deformed. If necessary, loose all 6 screws 161.83.065 as far as the guide plates can release by themselves.

S0920-7.1engl.doc

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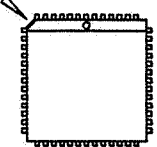


ESD-Safety measures in accordance with circular letter VZ 402  
(Service Manual No.3, Reg.18)

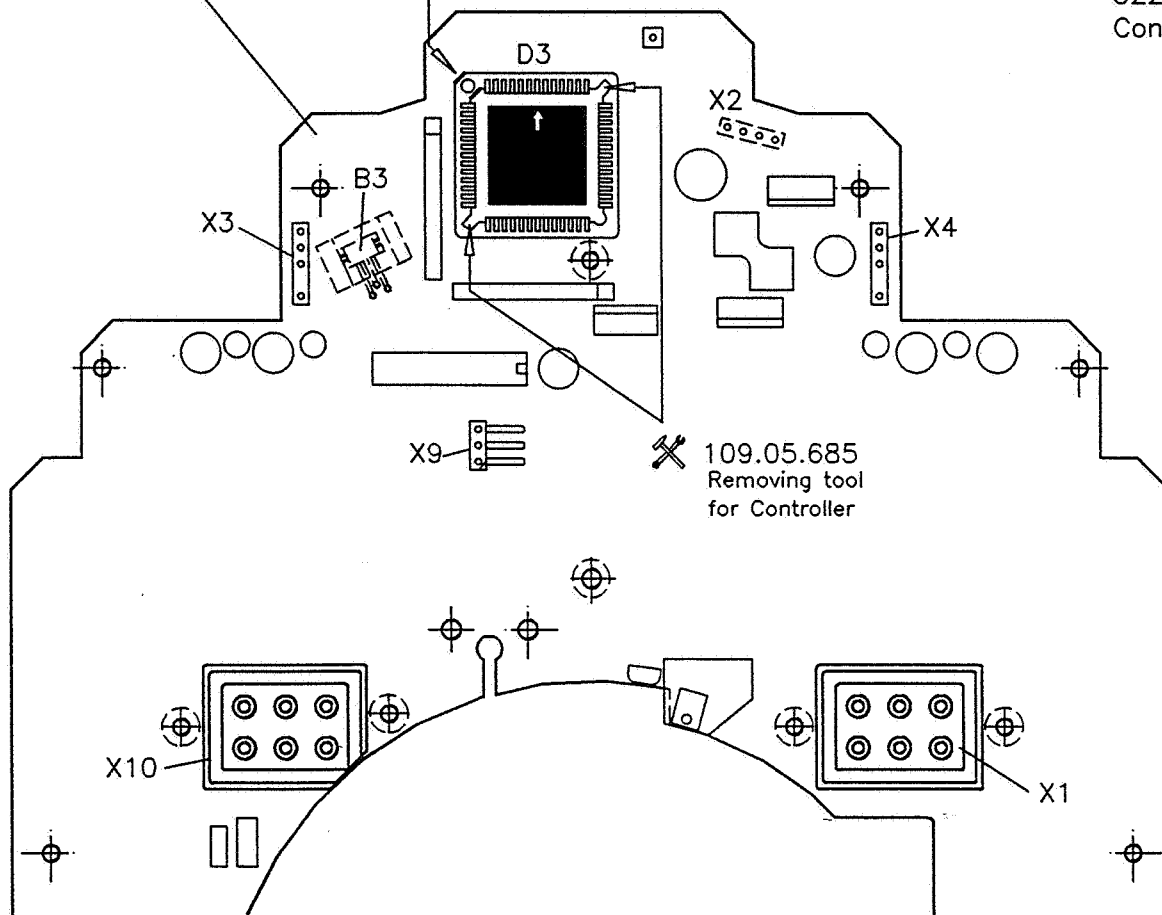
Position the Controller correctly in the socket.  
Push the Controller by steady pressing into  
the socket.

Attention:  
Do not bend the Print !!!

522.12.240  
Processorprint



522.12.650  
Controller



What has to be updated


What is to do in case of update

Service Station	Sinar
Reads out the data of the Controller which has to be exchanged by using the Viewer Software. Transmits the data to Sinar.	Reads back the transmitted data in a new programmed Controller. Delivers the updated components as ordered.

Please return the exchanged components to Sinar. You will then receive a credit note

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**A. In general**

The general information on cleaning procedure is listed in the service manual no. 1, register no. 0.

**1. Cleaning of the shutter blade 522.21.200 and 522.12.221 (0921-3)**

- Blow away the dust with compressed air or wipe with a soft dry cloth.
  - Wipe the more sticking residue with a soft cloth:
    - Wet with spirit if the surfaces are free of grease.
    - Wet with clean benzine if the surfaces show traces of grease.
- Clean the surface ( by moving in large circles) without pressure. Do not rub dry (formation of smears) but let dry on air.

**2. Cleaning of the clear glass and of the LCD shutter (0921-3)**

See instruction "Cleaning of Optical Elements Made of Glass or Plastic" service manual No.1, register No. 0.

**3. Cleaning of the guide plates (0921-3)**

Wipe the guide plates with a dry cloth. Use spirit only in tenacious cases, toluene acetone is not admissible.

**4. Lubricating of the blade wheel bearing (0921-3)**

After cleaning the blades lubricate slightly the blade bearing again before remounting. No grease must be outside the front ring areas at the blade bearing. Also slightly lubricate the bearing pin on the carrier plate (no grease in the thread!)

**5. Maintenance of the bearing of the LCD shutter wheel (0921-3)**

The bearing has to be protected from dirt and dust. The radial bearings is lubricated from the manufacturer with a special oil and thus have not to be re-lubricated. Possible dirt can be blown away with feeble compressed air.

**6. Assembling sequence**

Do not mix up the blade, LCD-shutter wheel and the guide blade as well as the toothed driving wheel when mounting them. When remounting please follow the disassembling sequence exactly from behind.

**7. Attention!**

Never press on the mounted blades as the guide plates will thereby be deformed. If necessary loose all 6 screws 161.83.065 as far as the guide plates can release again automatically.

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**B. Assembly and adjustment directions (0921-3)**

**Important:**

The washer ⇒ 166.33.063 has to be mounted and the screw ⇒ 164.20.001 has to be tightened when driving gear 1 and driving gear 2 are adjusted according to the below mentioned point 2 and 3.

The same is also valid for test runs for both of the driving gears when part 1 and 2 of the housing (0921-2) are not mounted yet. The screw as well as the washer should not be removed before mounting the two housing parts.

**1. Stepping motors 1 and 2**

Stepping motor 1 522.12.213 moves the shutter blade 522.21.200 / 522.12.221.

Stepping motor 2 522.21.214 moves the LCD-shutter wheel 522.12.214.

Stepping motors can be swung out on the ground plate so that the gears do no more move into the gearings.

**2. Adjustment of the stepping motor 1 522.12.213**

- Tighten the screw 164.11.121 in such manner that the stepping motor does not shake.
- Push the toothed driving wheel onto the motor shaft. Threaded pins 163.61.050 directed against end of shaft.
- Adjust the mesh between the toothed driving wheel 522.21.311 and shutter blade 522.12.221 by swinging the stepping motor as far as the resulting backlash becomes very small.
- Control the resulting backlash between the toothed driving wheel and the shutter blade during a full turn of the blade. The toothed driving wheel must not exercise any radial force on the shutter blade. Possibly correct the adjustment.
- Fix screws 164.10.206 and 164.11.121.
- Check adjustment and correct, if necessary.
- Place upright the ground plate as sketched.
- Adjust the toothed driving wheel optimally on the motor shaft between the guide plates. Fix with threaded pins 163.61.050.
- Control whether the toothed driving wheel does not press on one side on one of the plates.
- Secure the screw 164.10.206.
- Secure the threaded pins 163.61.050.

**3. Adjustment of the stepping motor 2 522.21.214**

- Tighten the screw 164.11.121 in such manner that the stepping motor does not shake.
- Push the toothed driving wheel onto the motor shaft. Threaded pins 163.61.050 directed against end of shaft.
- Adjust the mesh between the toothed driving wheel 551.33.529 and LCD-shutter wheel 522.12.214 by swinging the stepping motor as far as the resulting backlash becomes very small.
- Place upright the ground plate as sketched.
- Adjust the toothed driving wheel optimally on the motor shaft between the guide plates. Fix with threaded pins 163.61.050.
- Control whether the toothed driving wheel does not press on one side on one of the plates.
- Readjust the mesh by swinging the stepping motor slightly as far as the resulting backlash becomes zero.
- Fix screws 164.10.206 and 164.11.121.
- Control the adjustment during a full turn of the LCD shutter wheel (max 240°).
- Secure the screw 164.10.206.
- Secure the threaded pins 163.61.050.

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522.12.100

**4. Aperture driving ring**

- The aperture driving ring can be mounted and dismantled so that it will not be hampered by the processor print .
- Push back aperture motor plate 522.12.212 until spiral comes out.
- Turn the aperture driving ring anti clockwise as far as possible against the aperture motor.
- After elimination of the guide ring the aperture driving ring can be lift off in axial direction.
- Place the spiral to the aperture driving ring in such manner that the radial play of the aperture driving ring in the guide ring keeps up.

If the spiral is pressed too strongly on the aperture driving ring it follows:

- loud, irregular operational noise of the motor
- transmission of the noise to the carrier plate (vibrations).