

PREFACE

This technical guide is intended to assist in the maintenance and repair of SEIKO watches.

It outlines the characteristics of SEIKO movements, calibres and mechanisms ; presents the order of disassembly and reassembly ; and explains the major points to be observed in repairing each movement.

Please read the instructions carefully ; this is the essence to obtain the maximum advantage of the guide.

It is hoped that the guide will provide answers to all technical problems and questions.

It is also suggested the guide be used as a sales assistant.



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This technical guide is intended to explain all technical data concerning the calibres of SEIKO watches, and to calibres assist in their repair.

The data are classified as follows:

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calibres*(yellow title-page)

**List of Basic & Derivative Calibres
in numerical order**1-2

1100A1-3

1104A1-8

17A1-4

2202A1-4

2205A1-3

2206A1-3

2406A1-6

2517B1-14

2706A1-6

2906A1-7

3703B1(1-4), 2(1), 3(1-6), 4(1-6)

4006A1-17

5206A1-8

5606A1-5

5619A1-2

6106A1-8

6138A1-10

6139A1-12

6309A1-7

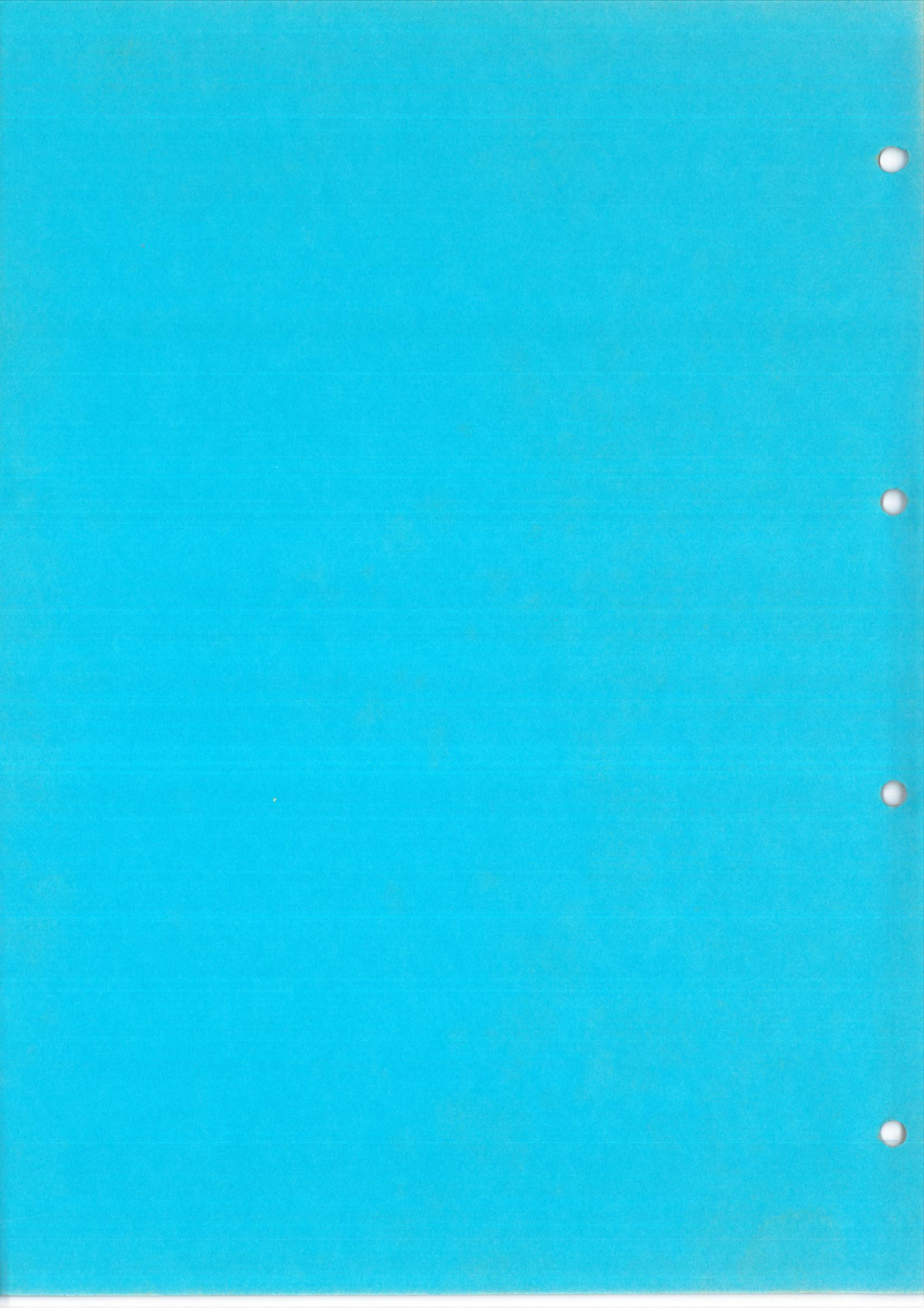
7005A1-4

7016A1-8

7019A1-2

8800C1-4

Items in common to all SEIKO watches



Diashock

1. Diashock (shock resistant device) is installed in every SEIKO watch.

It protects the balance staff against even repeated and violent impacts and helps make every SEIKO watch a highly accurate timepiece.

Salient features of Diashock include

- ① dynamic stability,
- ② high resistance to shock,
- ③ improved oil retention,
- ④ wide interchangeability, making for easy service.

Disassembly

The spring is easily removed by turning it gently with a tweezers as shown in Fig. 2.

Reassembly

Set the spring gradually into the Diashock frame by fitting and turning its three hooks one by one into the notch of the frame.

Oiling

After cleaning or applying Epilame treatment, cover the cap jewel and hole jewel with frame from the right above after oiling the cap jewel. Apply oil so that the quantity spreads over a maximum of one-half to a minimum of one-third of the hole jewel diameter (D), in the condition of setting the cap jewel, and hole jewel with frame, as shown in Fig. 3. (Moebius Synt-A-Lube)

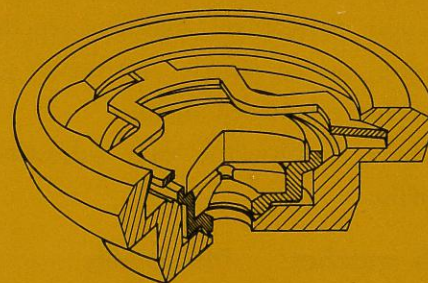


Fig. 1

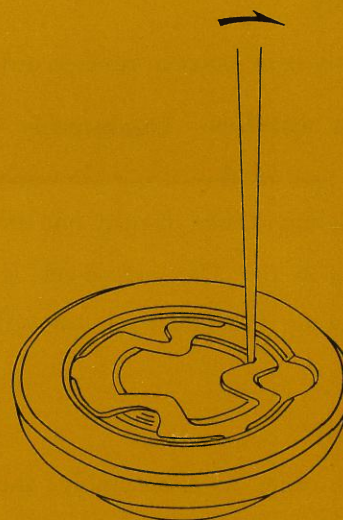


Fig. 2

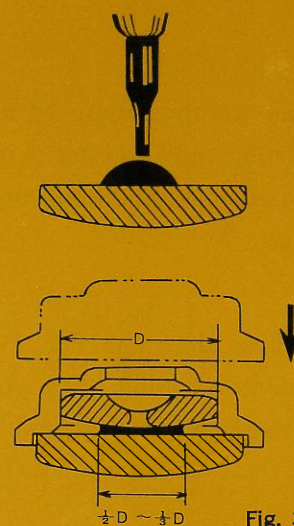


Fig. 3

Diafix

In most SEIKO watches, Diafix is used as a bearing for the third, fourth and escape wheels and pinions.

① Diafix insures the proper quantity of oil in application and perfect oil maintenance thereafter. The cap jewel, placed parallel to the hole jewel, maintains a fixed space between them.

② Diafix enables the easy adjustment of pinion end shake.

Men's watches Disassembly

The cap jewel is taken out by sliding down the spring and removing it with tweezers, as indicated in Figs. 2 & 3.

Reassembly

Reassembly is in exact in reverse order to disassembly.

Women's watches Disassembly

The two legs of the spring are removed with tweezers by pushing them inward one by one, as shown in Figs. 4 & 5. The cap jewel is then taken out by removing the head of the spring, as shown in Fig. 6.

Reassembly

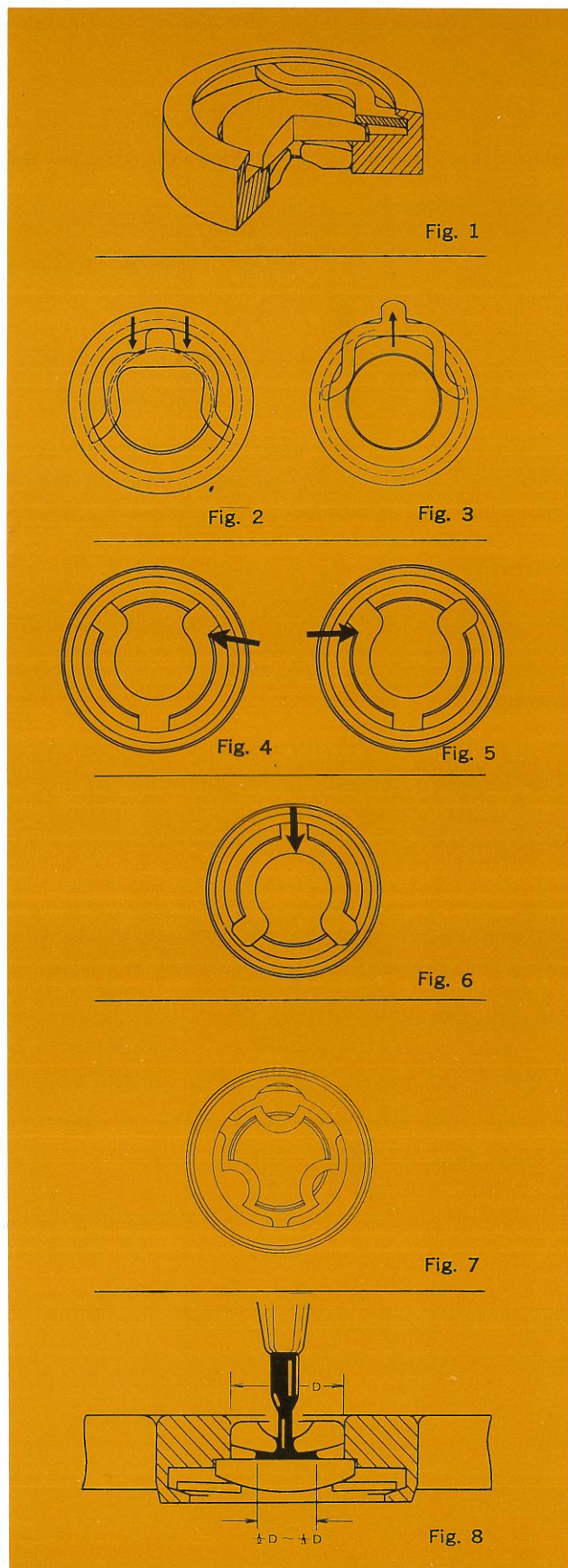
In reverse order to disassembly, the cap jewel is first set in. Then the spring is fixed, as shown in Figs. 4, 5 & 6.

Note:

There is an another type of diafix which has the same frame and spring with diashock's. As for disassembling the spring. refer to "Dia-shock." Fig. 7

Oiling






Apply the oil as shown in Fig. 7 after setting the cap jewel and the spring. Oil should be spread over a maximum of one-half and a minimum of one-third of the hole jewel diameter (D) Fig. 8



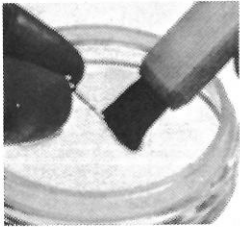
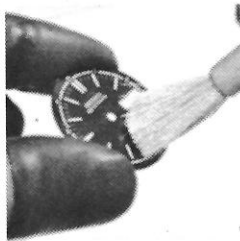
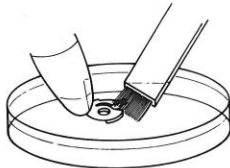
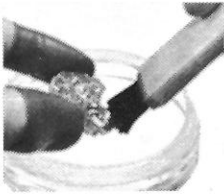

Cleaning of Parts

An increasing number of new models of wristwatches have appeared on the market recently whose parts are made not only of metal but also of electronic components such as electronic circuits and coils as well as of plastic parts. It goes without saying that the methods of cleaning electronic and plastic parts are different compared with conventional metallic parts in terms of the solutions to be used, time allowance and the drying temperature. The following instructions should be strictly observed in cleaning the various parts of a wristwatch. If methods of cleaning other than those mentioned are used, there is likelihood that malfunction of the parts may result.

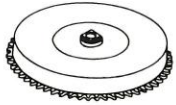



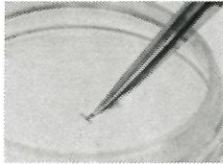
Methods of Cleaning as Classified by Parts

Name of Part	Cleaning	Drying	Solution	Remarks
Metallic outer casing parts Case, Caseband, Case back, Glass bezel, Case ring, Holding ring for dial	Brush 	Warm air	Benzine, Trichlorethylene Fuji-clean	
Plastic outer casing parts Case ring, Holding ring for dial 	Washing not necessary	—	—	When the parts get considerably dirty, wipe with clean cloth immersed in neutral cleaning solution.
Glass Tokilite Hardlex, Clearlex (non-reflective glass)	Washing not necessary Wipe with clean cloth 	—	—	Clearlex (non-reflective hardlex)
Gasket D pipe 	Rinse 	Cold air	Alcohol	Rinsing time is within five minutes. If left long in the alcohol the parts may expand. If washed in benzine the parts will expand in a short time.

Cleaning of Parts

Name of Part	Cleaning	Drying	Solution	Remarks	
Crown with stem Button	Brush 	Cold air	Alcohol	Washing time is within five minutes. If left long in alcohol the gasket will tend to expand.	
Dial (including plastic ones) Dial ring, Date dial, Day dial Hands	Wipe with dry brush or clean cloth 	—	—	Do not use benzine or trichlorene because the paint and printing will come off.	
Plastic Parts Date driving finger, Day driving finger, Intermediate day wheel, Day-date corrector wheel rocker	Rinse or clean with brush 	Cold air	Alcohol, Benzine, Daiflon, Trichlorethylene.	Washing time is within five minutes. In case of trichlorethylene, Ultra-sonic washing is possible.	
Electronic watch parts	Main plate Cal. 37	Brush 	Cold air	Benzine, Alcohol, Daiflon	As binding agent is used, washing time is within five minutes. Do not use trichlorethylene. Be careful not to strip off binded parts.
	Circuit block Coil block Battery cap	Do not wash. Only dust off conductivity portion with cloth. 	—	—	If the parts are washed the circuit elements may deteriorate or the coils may get entangled. Therefore, do not wash the parts.

Cleaning of Parts

Name of Part	Cleaning	Drying	Solution	Remarks
<p>Barrel</p> 	<p>Wipe the surrounding of barrel arbor and cogs with cloth immersed in solution</p> 	<p>Cold air</p>	<p>Benzine</p>	<p>If the barrel of a self-winding watch is immersed directly in a solution, the oil from the slipping attachment will flow out and impair the function of the barrel.</p>
<p>Differential wheel, Roller locking wheel, Escape wheel and pinion</p> 	<p>Rinse</p>	<p>Cold air</p>	<p>Benzine</p>	<p>In some models, the surface of these parts has been specially treated. Do not use any other type of cleaning than rinse washing.</p>
<p>Pallete complete Balance</p> 	<p>Rinse</p> 	<p>Cold air</p>	<p>Benzine</p>	<p>To protect shellac of pallet jewel and roller jewel, always dry in cold air.</p>
<p>General parts</p>	<p>Ultrasonic washing or brush</p>	<p>Warm air</p>	<p>Trichlorethylene benzine (only in case of brush cleaning)</p>	

Cleaning of Parts

Precautions When Handling Washing Solutions

1. When solutions such as trichlorethylene and benzine are to be used, be sure that the room is fully ventilated.
2. Since benzine and alcohol are highly inflammable, be sure that fire is not brought near them when they are used.
3. Be careful not to allow trichlorethylene drop directly on your skin or into your eyes.
4. Because benzine and alcohol are highly inflammable, never use ultrasonic washing as it is very dangerous.

Table of Plastic Parts

Calibre 56 series	Day driving finger, Day-date corrector wheel rocker, Intermediate date wheel
Calibre 61 series	Date driving finger, Day driving finger, Intermediate date wheel
Calibre 37 series	Insulator for power connection of battery, Coil block, Circuit block, Battery cap, Battery insulation frame
Outer casing parts	Glass, Case, Case ring, Dial, Holding ring for dial, Plastic (water resistant) ring

OILING

This paragraph is to explain oiling portions and oil to be used for all calibres of SEIKO watches on the market.

Oiling must be made in accordance with the following procedures contained in this paragraph, otherwise the life of watches may be affected.

The oiling instructions are found in two parts separately—the first half pages which are illustrated with yellow color diagrams and the last half pages

which are illustrated with the movement diagrams for disassembling, reassembling and lubricating procedures.

Representative calibres are selected to explain how to oil. For other calibres, apply the instruction for each representative calibre.

Relations between the representative calibre and other calibres are shown in the table below:

Representative Calibre	Page	Applicable calibre
1000C	* 1000-1	1020, 1040, 1500, 1520
1100A	Cal. 1100A	1120
1104A	* 1104-1	1140, 1144
17A	Cal. 17A	1719
2118A	* 2118-1	2100, 2102, 2104, 2105, 2107, 2117, 2119, 2140, 2160
2202A	Cal. 2202A	2220, 2242
2205A	Cal. 2205A	2201, 2206, 2245
2406A	Cal. 2406A	2409, 2411, 2415, 2418, 2419, 2421, 2426, 2431, 2435, 2466
2517A	* 2517-1	2501, 2502, 2505, 2515, 2516, 2518, 2519, 2539, 2559, 2565
2706A	Cal. 2706A	
2906A	Cal. 2906A	
3703B	Cal. 3703B	3700, 3702
4006A	4006-1	4005
5206A	Cal. 5206A	5216, 5245, 5246, 5256
5606A	Cal. 5606A	5601, 5605, 5621, 5625, 5626, 5641, 5645, 5646
5619A	Cal. 5606A & 5619A	
6106A	* 6106-1	6100, 6102, 6105, 6109, 6110, 6117, 6118, 6119, 6145, 6146, 6159
6138A	Cal. 6138A	
6139A	Cal. 6139A	
6309A	Cal. 6309A	6300, 6302, 6306, 6308, 6319
7005A	* 7005-1	7001, 7025
7016A	Cal. 7016A	7006, 7009, 7015, 7017, 7018, 7019 (Refer to text also), 7039
8800C	* 8800-1	8810, 8811, 8814, 8820, 8821, 8823, 8830

Remarks:

For the calibres with asterisk (*), refer to the oiling instructions on first half pages illustrated with yellow color diagrams. For other calibres, refer to

the oiling instructions on last half pages illustrated with the movement diagram for disassembling, reassembling and lubricating procedures.

I. Explanations on Types of SEIKO Watch Oils

1. SEIKO watch oil S-2

Use this S-2 as a lubricating oil for slipping attachments of the automatic winding main-spring *without* a black ring mark on the barrel cover.

2. SEIKO automatic winding mainspring oil, S-3

Use this S-3 as a lubricating oil for slipping attachments of the automatic winding main-spring *with* a black ring mark on the barrel cover.

3. SEIKO watch oil S-4

This is a grease-like oil with an excellent extreme-pressure characteristic. Use this oil for lubricating and preventing abrasion on automatic winding mechanisms, setting mechanisms, and so forth.

Lubricating the pivots of train wheels

- (1) Before assembling the wheels, apply S-4 to the bottom surface of the hole jewel.
- (2) Set the wheel by inserting its pivot in the lubricated hole jewel.

Note: No effect can be expected by lubricating the hole jewel from the upper portion after assembling the wheel.






4. Moebius Synt-A-Lube

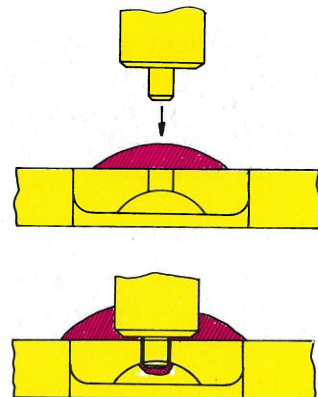
This lubricating oil is applied to those parts most sensitive to friction loss; for example, such as the pivot of front train wheel, pallet jewel, etc.

5. Silicon grease, 500,000 c/s

Use this grease for coating gaskets on outer parts, and to maintain airtight and water resistant characteristics.

In this lubrication manual, SEIKO watch oils are discriminated by colors as follows:

Oil nomenclature	Color
SEIKO watch oil S-2	
SEIKO watch oil S-3	
SEIKO watch oil S-4	
Moebius Synt-A-Lube	
Silicon grease 500,000cs	



II. Oil Quantity

In this lubrication manual, the oil quantity can be recognized by the symbols shown in Fig. 1. Follow these symbols and apply the correct quantity of oil.

1. \triangleright : Small quantity

To portions bearing this symbol, apply a small quantity of oil. Since these are very delicate portions affecting watch preciseness, watch functions, appearance, durability and so on, pay special attention when lubricating. Fig. 2

2. $\circ\triangleright$: Normal quantity

To portions bearing this symbol, apply a normal quantity of oil. This symbol is used on most watch parts such as the Diashock, Diafix, and upper and lower pivots of each wheel. Fig. 3

3. $\circ\circ\triangleright$: Sufficient quantity

Use a sufficient quantity of oil for those portions bearing this symbol as shown in Fig. 4

Small quantity	\triangleright
Normal quantity	$\circ\triangleright$
Sufficient quantity	$\circ\circ\triangleright$

Fig. 1

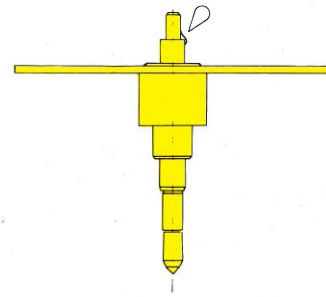


Fig. 2

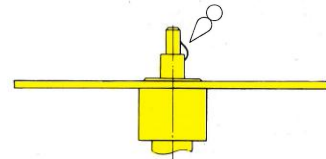


Fig. 3

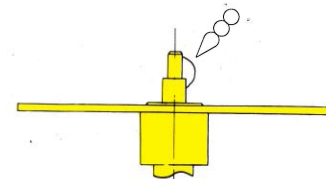


Fig. 4

III. Items Requiring Special Attention When Lubricating

Items common to all SEIKO Watches

The following items are applicable in common to all SEIKO Watches.

• Diashock

After cleaning or applying an Epilame treatment, cover the cap jewel and hole jewel with frame from directly above after oiling the cap jewel. Apply oil so that the quantity spreads over from one-half to one-third of the hole jewel diameter (D) in the condition of setting the cap jewel and hole jewel with frame. Fig. 1

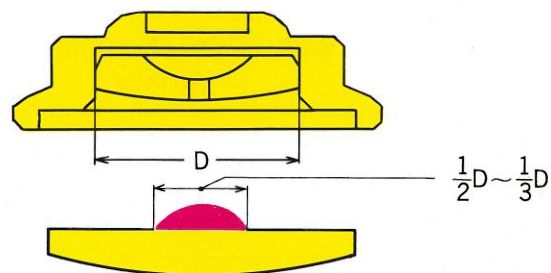


Fig. 1

• Diafix

Apply oil as shown in Fig. 2 after setting the cap jewel and the spring. Oil should be spread over from one-half to one-third of the hole jewel diameter (D).

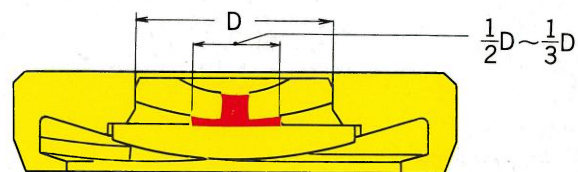


Fig. 2

• Pallet jewels

The pallet jewel and the tip of escape wheel and pinion are very important points to be lubricated. Closely follow the instructions below.

a. Lubricate after assembling the pallet

Since a viewing hole is provided on the plate to observe the pallet jewels, lubricate the impulse surface of the pallet jewels by inserting an oiling stick through the hole. Or before assembling the balance, lubricate the impulse surface of the pallet jewels or escape wheel from the front (side with bridges).

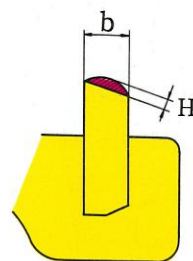


Fig. 3



Fig. 4

b. Confirm lubricated condition

After lubricating, always turn the escape wheel one revolution and confirm whether or not oil is well spread on teeth of the escape wheel and is properly applied to the contacting surface of the pallet jewels.

c. Oil quantity

Oil quantity, in swelling height (H), should be adjusted to become from one-fifth to one-sixth of the width of the pallet jewels (b). For impulse surface of the escape wheel, lubricate from 5 to 6 teeth. Fig. 3, Fig. 4

• Pivots of pallet

When the oil quantity is excessive, oil is dispersed on the pallet body which may cause malfunctions; therefore, apply an extremely small quantity. Some calibres need no lubricating, so exercise care!

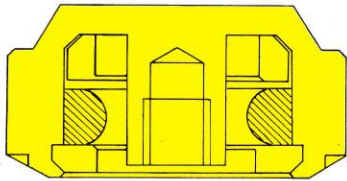
• Cannon pinion

Since the hour wheel is assembled on the cannon pinion, the pressure on this cannon pinion and the hour wheel becomes so heavy in cases where movements have calendar mechanisms that it is necessary to apply only a small quantity of oil. When too much oil is applied, it will flow out to the dial and stain it. Pay attention to this point.

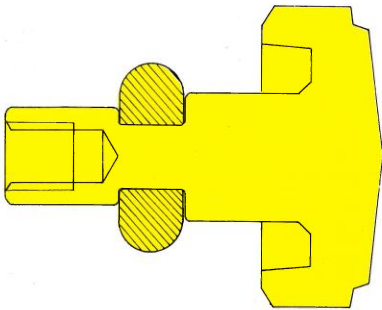
IV. Lubricating the Casing Parts (Case, Crown)

Apply silicon grease to the following portions (some differences may exist because outer construction varies):

1. **Case back gasket:** Apply thinly over entire surface
2. **Water resistant crown gasket**

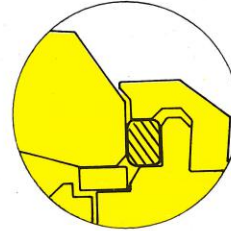


W type

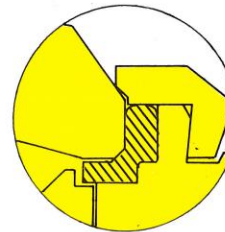


M type

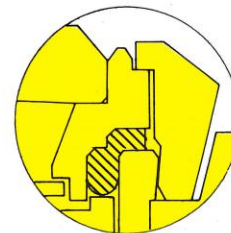
3. Glass gasket



Glass side gasket



L-type gasket



Reverse L-type gasket

Principal reason for applying grease to gaskets is to improve workability and to prevent gaskets from twisting and slipping to one side; therefore, apply sparingly. Never apply grease to portions contacting the dial.

Oiling 1000C

1. Lubricating points and types of oil

Refer to { Front train wheelFig. 1
 Winding stem
 Hand setting mechanism } ...Fig. 2

Oil to be used for this caliber

- : Moebius Synt-A-Lube
- : Seiko watch oil S-4

Oil quantity

- : Extremely small quantity
- : Normal quantity

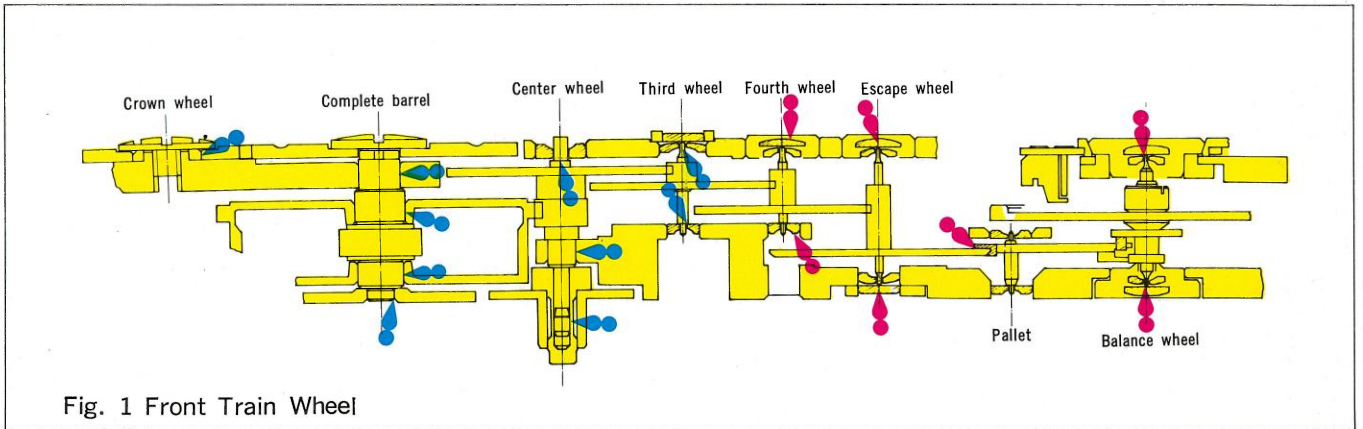


Fig. 1 Front Train Wheel

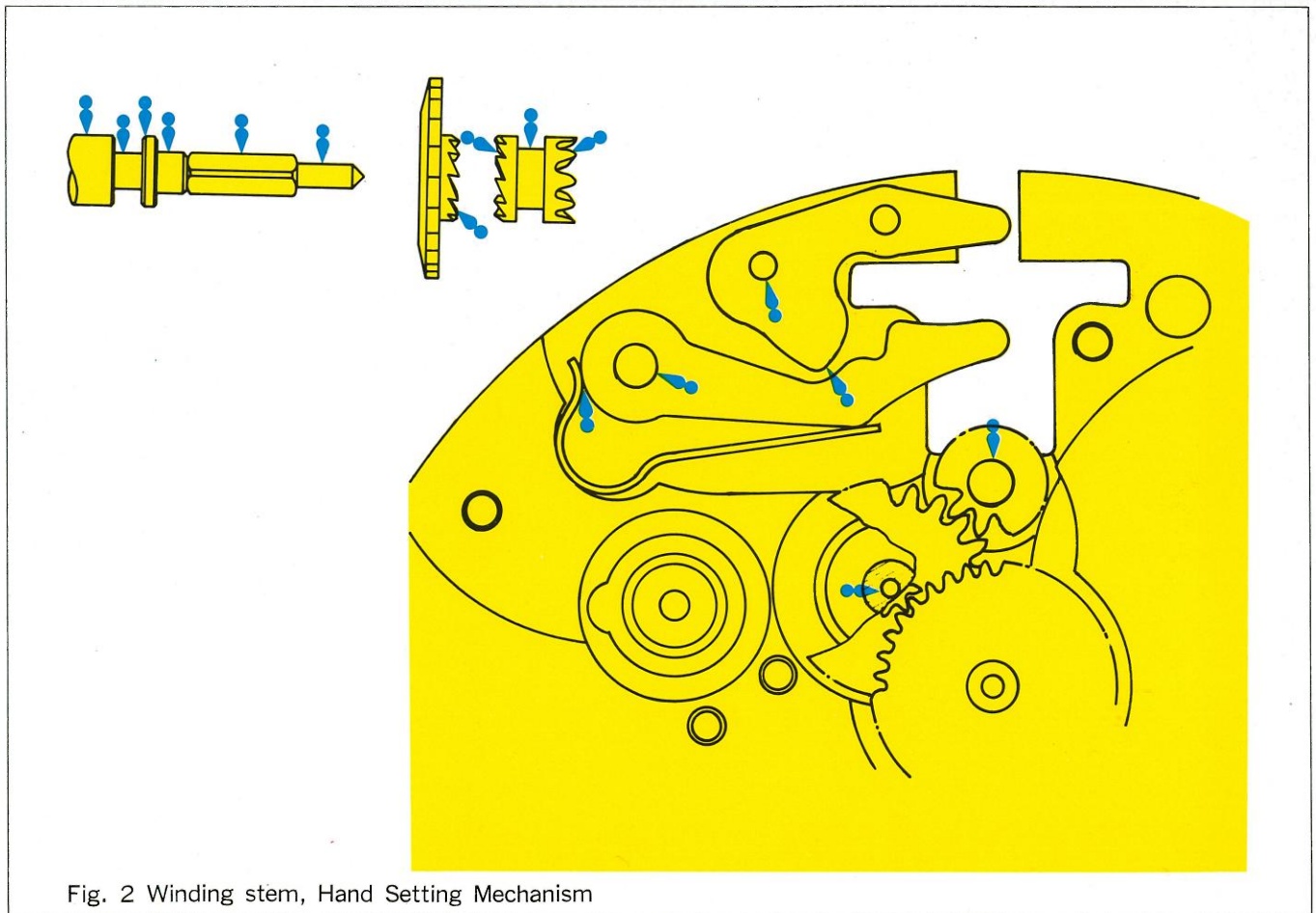





Fig. 2 Winding stem, Hand Setting Mechanism

Oiling 2118A




1. Lubricating points and types of oil

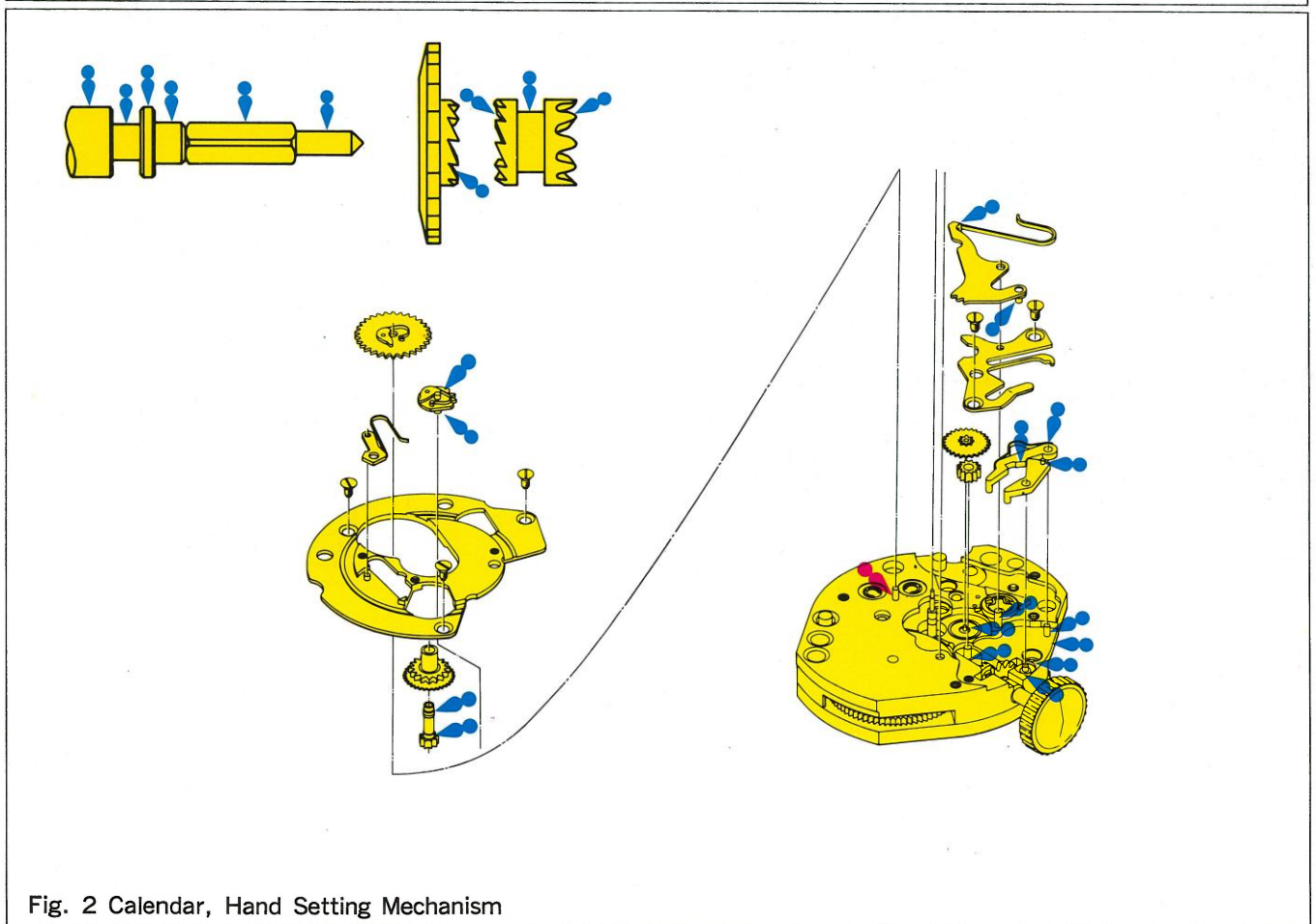
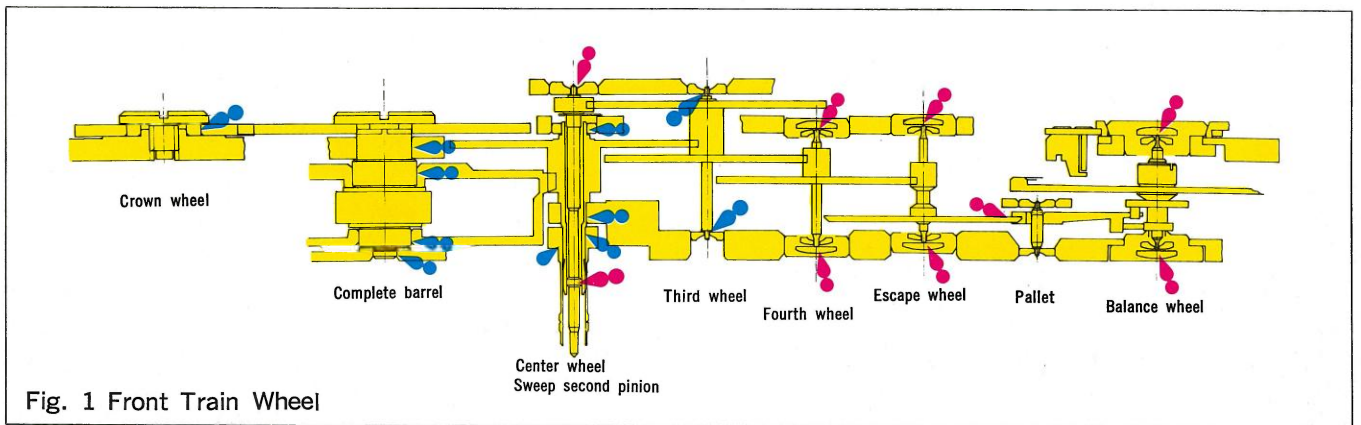
Refer to { Front train wheelFig. 1
 Calendar
 Hand setting mechanism }Fig. 2

Oil to be used for this caliber

-  : Moebius Synt-A-Lube
-  : Seiko watch oil S-4
-  : Seiko silicon grease

Oil quantity

-  : Extremely small quantity
-  : Normal quantity
-  : Sufficient quantity



2. Points requiring special attention in lubricating

2.1 Date correcting mechanism

In this caliber, it is important to lubricate the date correcting mechanism which automatically resets the crown after correcting the date.

- Date corrector
- Setting lever spring

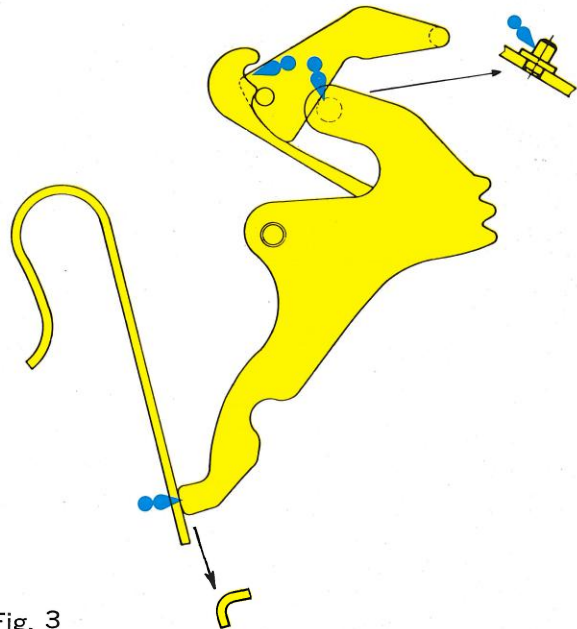


Fig. 3

- Contacting portion of the setting lever and plate

To effect smooth operation of the setting lever, apply small quantity of oil little by little to the portion. Fig. 4

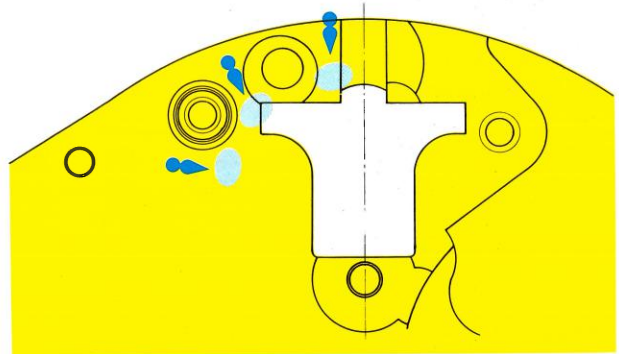


Fig. 4

- Crown gasket (in case of waterproof watch)
Lubricate silicon grease to the crown gasket of the waterproof case with an oiling stick.

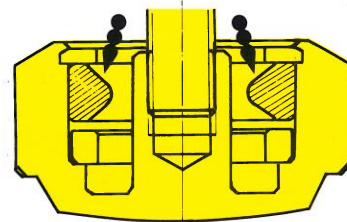





Fig. 5

Oiling 4006A




1. Lubricating points and types of oil

- Refer to {
- Front train wheel.....Fig. 1
 - Setting mechanismFig. 2
 - Automatic winding mechanismFig. 3
 - Calendar and bell mechanismFig. 4

Oil to be used for this caliber

-  : Moebius Synt-A-Lube
-  : Seiko watch oil S-4
-  : Seiko watch oil S-2

Oil quantity

-  : Extremely small quantity
-  : Normal quantity
-  : Sufficient quantity

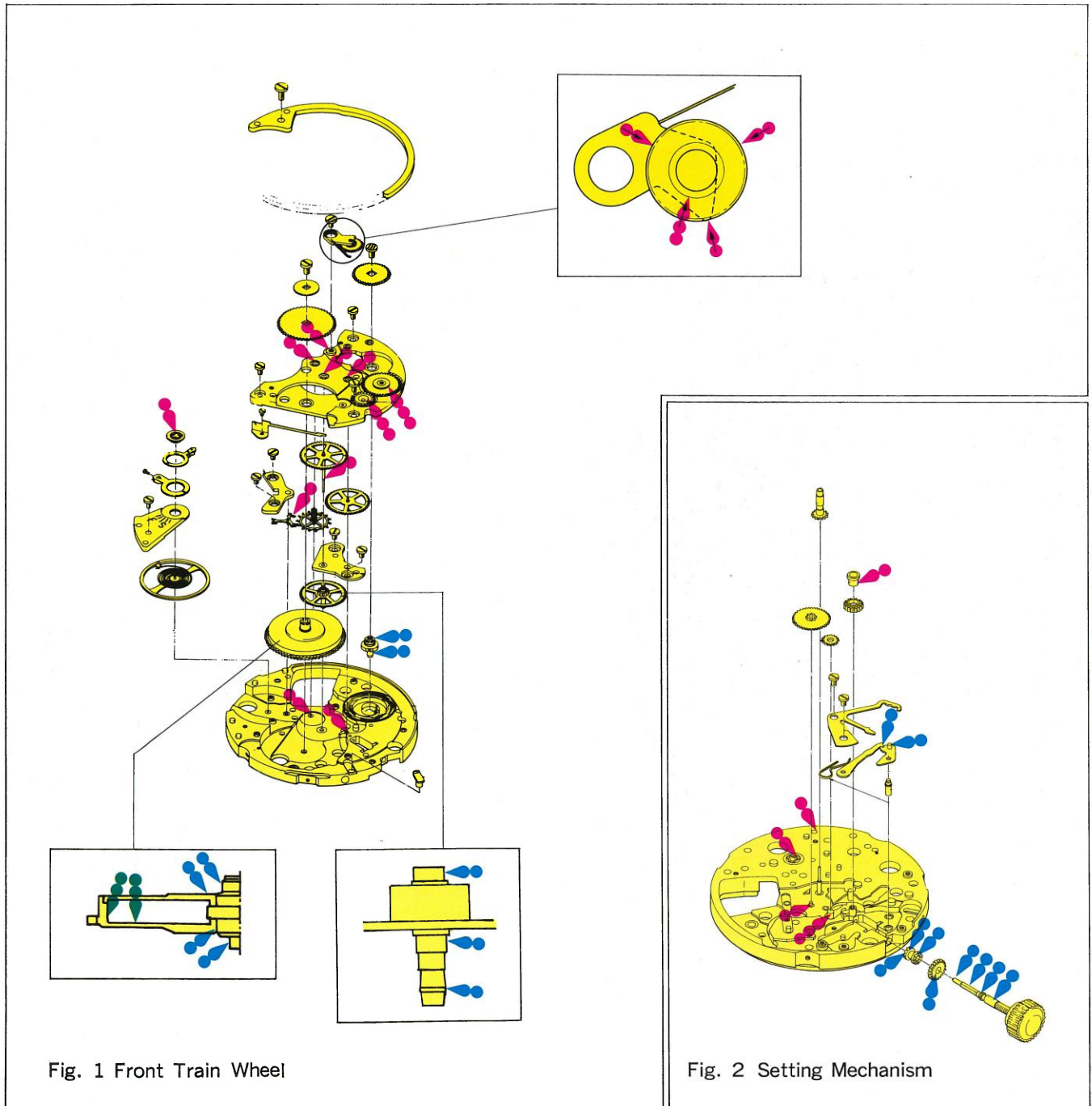


Fig. 1 Front Train Wheel

Fig. 2 Setting Mechanism

Lubricate the three ball bearings alternately.

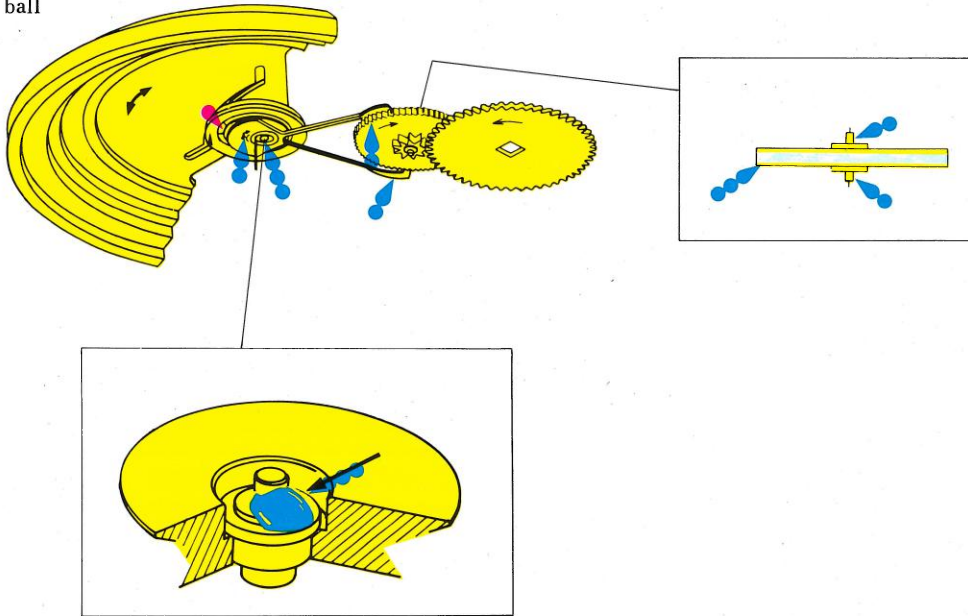


Fig. 3 Automatic Winding Mechanism

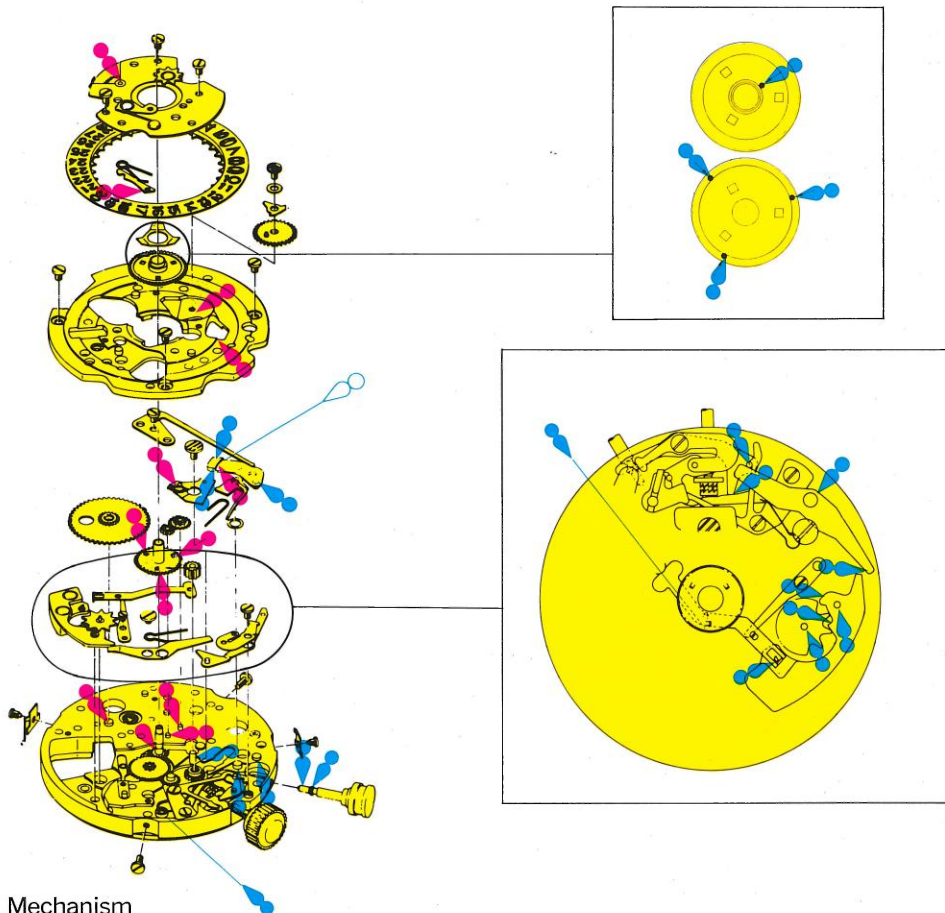





Fig. 4 Calendar and Bell Mechanism

Oiling 6106A





I. Lubricating points and types of oil

- Refer to {
- Front train wheelFig. 1
 - Calendar
 - Hand setting mechanism }Fig. 2
 - Automatic winding mechanismFig. 3

Oil to be used for this caliber

-  : Moebius Synt-A-Lube
-  : Seiko watch oil S-4
-  : Seiko watch oil S-2

Oil quantity

-  : Extremely small quantity
-  : Normal quantity
-  : Sufficient quantity
-  : Lubricate on the back side

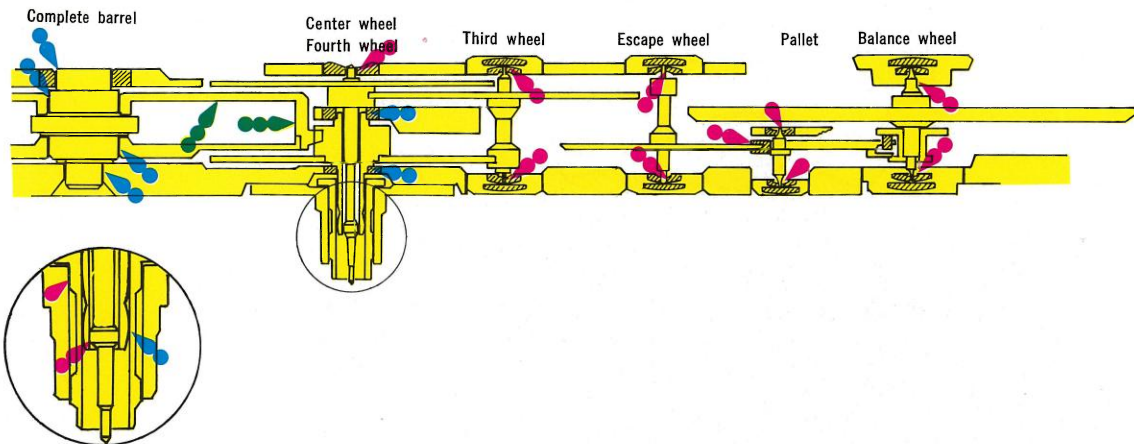


Fig. 1 Front Train Wheel

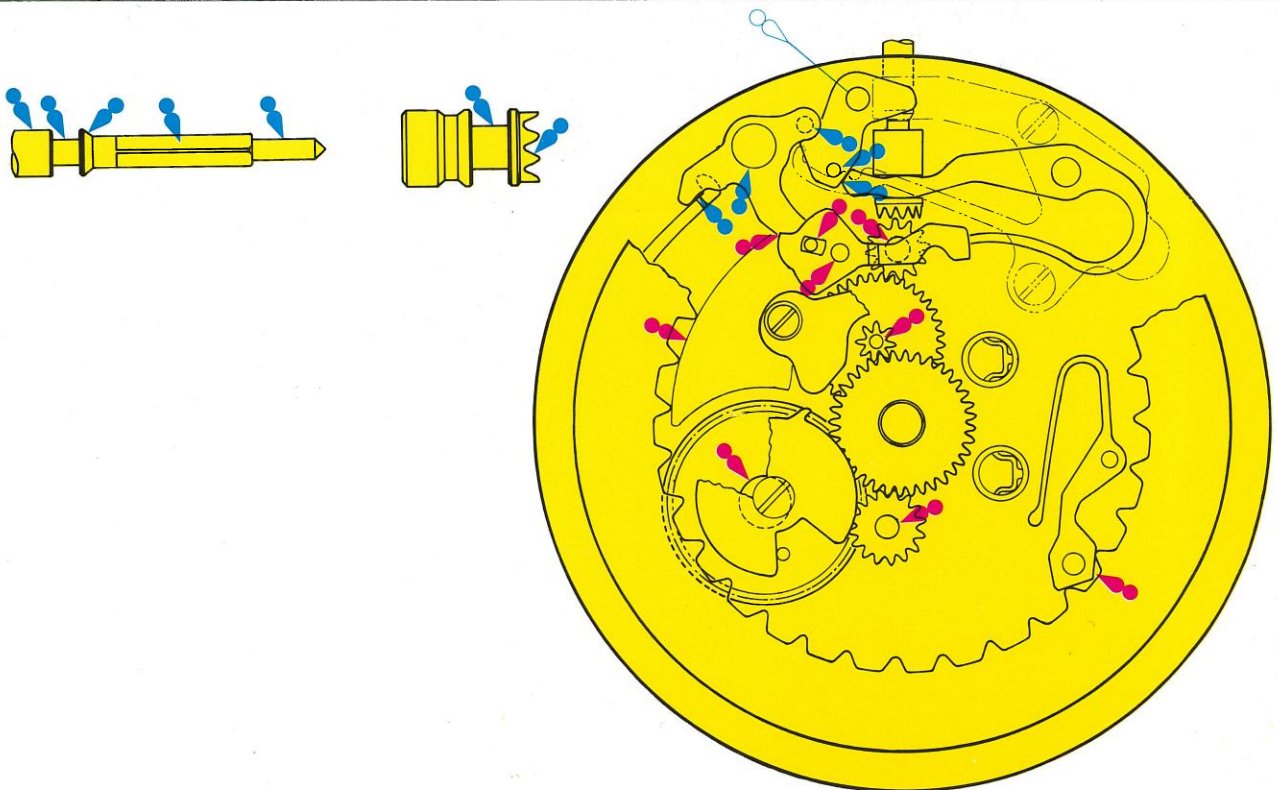


Fig. 2 Calendar, Hand Setting Mechanism

Lubricate the three ball bearings alternately.

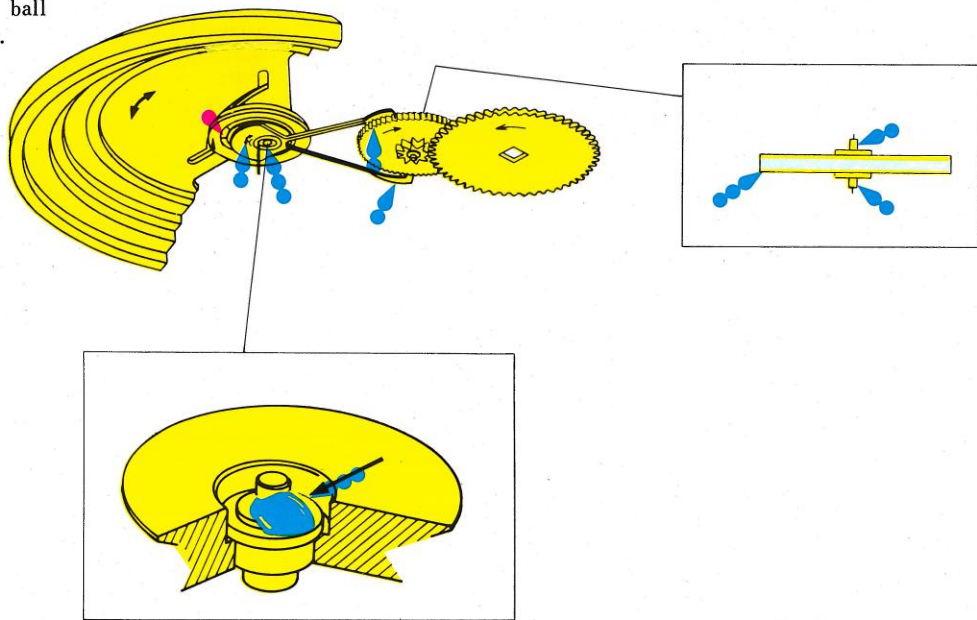


Fig. 3 Automatic Winding Mechanism

Casing (Seiko water resistant case)

CASING

In watch repair servicing, it is essential for watchmakers to know the case construction as well as the movement construction. There are different kinds of the cases since SEIKO has a wide range of models on the overseas market. Especially, there are more advanced construction of the glass portion in these models than there is in the case back construction. Considering that it will sooner occur for repair of the mentioned portion in after-sale servicing than repairing the movement shortly after the watches are placed on the market, the casing item is, therefore, shown in the technical guide book as follows:

The case back construction of SEIKO watches is classified into five types. Each case back construction has several types of glass construction.

The combination is given on the table of "Index List for Case Construction" and "Glass & Bezel Construction". Each type of case construction is shown in details on the separate pages. Refer to each explanation sheet in repair servicing.

Index List for Case Construction (on Green pages)

This table shows the entire case construction by indexing the case number.

Remarks:

Explanation of the ordinary-type case is not included in the index list for case construction (on green page).

For example:

Case No.	Category/Type No.	Index No.
6119-802	A-1	Snap-3

A-1 in the above list indicates one of the types on the table of the Glass construction that is classified into respective categories by the glass and bezel construction and shows ITS SECTION OF EACH CONSTRUCTION.

Snap-3 in the above list explains the entire case construction on the separate sheet, including disassembling and reassembling procedures.

Remarks: The case number is engraved on the surface of the case back of each watch for identification.

Note: When a four (4) digit number appears after the - (Hyphen) of the case reference number on the back of the case, please disregard the 4th digit and refer to the following green sheets to establish the case construction.



Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.
2406-002	G-1	Screw-14	2517-029	F-1	Screw-5	2706-010	G-1	Screw-14
003	G-1	Screw-14	031	F-1	Screw-5	011	G-1	Screw-14
004	G-1	Screw-14	033	A-1	Snap-3	012	A-1	Screw-1
005	G-4	Screw-18	034	A-1	Snap-3	013	G-1	Screw-14
006	G-4	Screw-18	035	A-1	Screw-7	016	G-1	Screw-14
007	G-1	Screw-14	036	A-1	Screw-7	017	G-1	Screw-14
300	K-3	Square-3	037	F-1	Snap-2	018	G-1	Screw-14
301	K-3	Square-3	038	F-1	Screw-5	019	A-1	Screw-1
304	K-4	Square-4	039	A-1	Screw-7	020	G-1	Screw-14
2409-001	T-1	One-piece-2	041	A-1	Screw-7	021	F-3	Screw-12
300	K-3	Square-3	042	F-3	Screw-12	022	F-3	Screw-12
2411-005	B-1	One-piece-5	043	F-3	Screw-12	024	F-4	Screw-16
006	F-4	Screw-16	044	A-1	Screw-7	025	F-4	Screw-16
300	K-3	Square-3	045	F-1	Screw-5	026	F-4	Screw-16
2415-301	K-4	Square-4	046	A-1	Screw-7	027	F-4	Screw-16
2421-001	G-4	Screw-18	047	A-1	Screw-7	028	F-4	Screw-16
2426-001	G-4	Screw-18	048	F-5	Screw-8	029	G-3	Snap-4
002	G-4	Screw-18	051	F-3	Screw-12	030	F-4	Screw-16
003	G-3	Snap-4	052	F-3	Screw-12	031	G-3	Snap-4
2431-003	G-1	Screw-14	053	F-3	Screw-12	032	G-3	Snap-4
004	G-1	Screw-14	056	A-1	Screw-7	033	F-4	Screw-16
2466-001	G-4	Screw-18	320	B-1	One-piece-4	034	G-3	Snap-4
002	G-3	Snap-4	326	A-1	Screw-11	035	G-3	Snap-4
2501-002	F-1	Snap-2	327	A-1	Screw-11	036	A-1	Screw-11
003	F-1	Snap-2	330	A-1	Screw-11	037	G-3	Snap-4
005	A-1	Snap-3	332	A-1	Screw-11	038	G-3	Snap-4
006	A-1	Snap-3	2518-007	B-1	One-piece-4	300	K-1	Square-1
007	A-1	Snap-3	008	T-1	One-piece-2	301	K-1	Square-1
008	A-1	Snap-3	011	A-1	Screw-7	302	K-1	Square-1
009	T-1	One-piece-2	012	T-1	One-piece-2	303	K-1	Square-1
010	F-5	Snap-2	013	F-1	Snap-2	304	K-1	Square-1
2502-003	B-1	One-piece-4	015	F-5	Snap-2	305	K-1	Square-1
2505-005	F-1	Snap-2	017	F-1	Snap-2	306	K-1	Square-1
009	F-1	Screw-5	018	A-1	Snap-3	307	K-1	Square-1
010	F-1	Screw-5	019	A-1	Snap-3	308	K-1	Square-1
011	F-1	Screw-5	020	A-1	Screw-11	309	K-1	Square-1
012	F-1	Screw-5	021	A-1	Screw-11	310	K-6	Square-6
014	F-1	Screw-5	022	A-1	Snap-3	311	K-1	Square-1
703	B-1	One-piece-4	023	F-5	Snap-2	700	S-1	Screw-10
704	F-1	Screw-5	024	F-1	Screw-5	701	K-1	Square-1
2515-002	F-1	Snap-2	025	F-1	Screw-5	702	S-1	Screw-10
003	F-1	Snap-2	026	F-5	Snap-2	703	S-1	Screw-10
2516-001	F-1	Screw-5	301	K-2	Snap-1	704	G-1	Screw-14
002	F-1	Screw-5	706	S-1	Screw-10	705	S-1	Screw-10
003	F-1	Screw-5	2559-303	K-4	Square-4	706	S-1	Screw-10
004	F-1	Screw-5	2565-001	A-1	Screw-7	707	K-1	Square-1
005	A-1	Screw-7	002	A-1	Screw-7	709	S-1	Screw-10
006	A-1	Screw-7	2706-001	F-6	Screw-17	2906-001	A-1	Screw-7
2517-021	F-1	Screw-5	002	A-1	Screw-1	002	A-1	Screw-7
022	F-1	Screw-5	003	F-6	Screw-17	003	G-3	Snap-4
023	F-1	Screw-5	004	F-6	Screw-17	004	A-1	Screw-7
024	F-1	Snap-2	007	G-1	Screw-14	005	G-3	Snap-4
026	T-1	One-piece-3	008	G-1	Screw-14	006	G-3	Snap-4
028	F-1	Screw-5	009	G-1	Screw-14	007	G-3	Snap-4

Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.
2906-008	G-3	Snap-4	4500-700	F-3	Screw-12	5139-701	A-1	Screw-7
009	G-3	Snap-4	701	F-3	Screw-12	702	A-1	Screw-7
010	G-3	Snap-4	800	A-1	Screw-7	703	A-1	Screw-7
014	A-1	Screw-7	801	A-1	Screw-7	704	A-1	Screw-7
015	G-3	Screw-20	4502-700	F-3	Screw-12	705	A-1	Screw-1
016	A-1	Screw-7	701	F-3	Screw-12	706	A-1	Screw-1
017	G-3	Screw-20	800	A-1	Screw-7	800	A-1	Screw-7
022	G-3	Screw-20	801	A-1	Screw-7	5146-500	S-1	Screw-10
300	K-1	Square-1	4520-700	F-3	Screw-12	501	S-1	Screw-10
301	K-1	Square-1	701	F-3	Screw-12	502	S-1	Screw-10
302	K-1	Square-1	702	F-3	Screw-12	700	A-1	Screw-1
303	K-1	Square-1	800	A-1	Screw-7	701	A-1	Screw-1
304	K-1	Square-1	801	A-1	Screw-7	702	F-5	Screw-8
305	K-8	Square-8	802	A-1	Screw-7	703	F-5	Screw-8
306	K-1	Square-1	4522-700	F-3	Screw-12	704	F-3	Screw-12
307	K-1	Square-1	701	F-3	Screw-12	705	F-5	Screw-8
500	K-1	Square-1	800	A-1	Screw-7	706	T-1	One-piece-1
501	S-1	Screw-10	801	A-1	Screw-7	708	F-3	Screw-12
502	K-1	Square-1	4580-700	F-2	Screw-2	709	A-1	Screw-7
700	S-1	Screw-10	701	F-3	Screw-12	5206-500	K-3	Square-3
701	S-1	Screw-10	702	F-3	Screw-12	501	K-3	Square-3
702	K-1	Square-1	5106-700	F-1	Screw-6	502	K-3	Square-3
703	S-1	Screw-10	701	A-1	Screw-7	503	K-3	Square-3
3700-700	A-1	Screw-1	702	A-1	Screw-7	504	K-3	Square-3
800	A-1	Screw-1	703	F-3	Screw-12	505	K-3	Square-3
3702-700	A-1	Screw-1	704	A-1	Screw-7	506	K-3	Square-3
701	A-1	Screw-1	705	F-3	Screw-12	507	K-3	Square-3
800	A-1	Screw-1	801	F-1	Screw-6	508	K-3	Square-3
3703-700	A-1	Screw-1	802	F-5	Screw-8	600	T-1	One-piece-1
702	A-1	Screw-1	803	F-1	Screw-6	601	A-1	Screw-7
703	A-1	Screw-1	900	A-1	Screw-7	602	F-3	Screw-12
704	A-1	Screw-1	5126-600	F-1	Snap-2	603	F-3	Screw-12
800	A-1	Screw-1	601	F-2	Screw-2	605	F-3	Screw-12
801	F-3	Screw-12	603	F-2	Screw-9	606	F-3	Screw-12
802	F-3	Screw-12	700	A-1	Snap-3	607	F-3	Screw-12
803	F-3	Screw-12	701	F-1	Snap-2	608	F-3	Screw-12
804	F-3	Screw-12	702	F-5	Snap-2	609	F-3	Screw-12
4005-700	A-1	Screw-1	703	F-5	Snap-2	610	F-3	Screw-12
600	A-1	Screw-1	800	F-1	Snap-2	611	F-3	Screw-12
4006-601	A-1	Screw-1	801	A-1	Snap-3	612	F-3	Screw-12
602	A-1	Screw-1	802	F-1	Snap-2	613	F-3	Screw-12
603	A-1	Screw-1	803	A-1	Snap-3	614	S-2	Screw-15
604	A-1	Screw-1	804	A-1	Snap-3	615	F-3	Screw-12
605	A-1	Screw-7	805	A-1	Snap-3	500	K-5	Square-5
606	A-1	Screw-7	806	A-1	Snap-3	501	K-3	Square-3
607	A-1	Screw-7	807	A-1	Snap-3	600	F-3	Screw-12
608	A-1	Screw-7	808	F-2	Screw-4	601	F-3	Screw-12
700	A-1	Screw-1	809	F-2	Screw-4	602	F-3	Screw-12
701	A-1	Screw-1	810	F-2	Screw-4	603	F-3	Screw-12
702	A-1	Screw-1	811	A-1	Snap-3	604	F-3	Screw-12
4400-999	F-1	Screw-1	812	F-2	Screw-4	605	F-3	Screw-12
4402-800	F-1	Screw-6	813	F-2	Screw-4	606	G-2	Screw-14
4420-900	F-1	Screw-6	5139-600	A-1	Screw-1	700	F-3	Screw-12
999	F-1	Screw-6	700	A-1	Screw-7	701	F-3	Screw-12

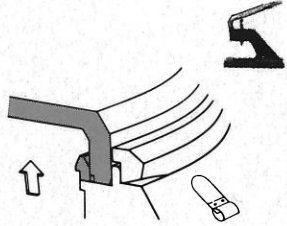
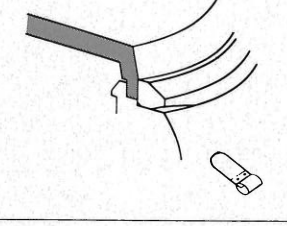
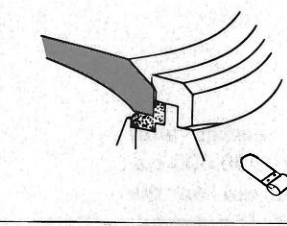
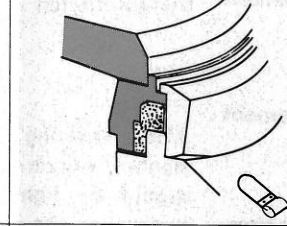
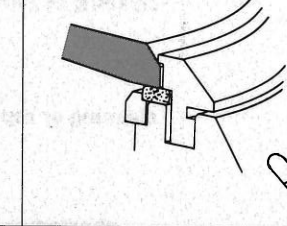
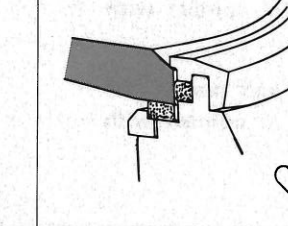
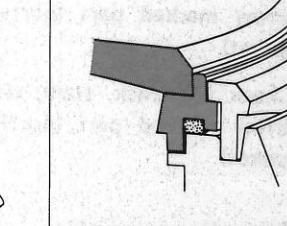
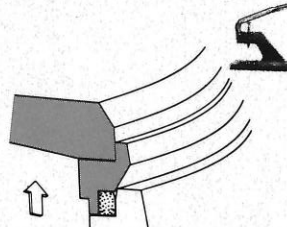
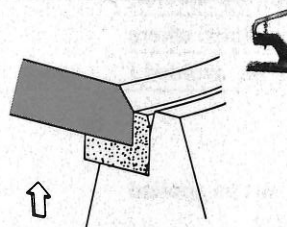
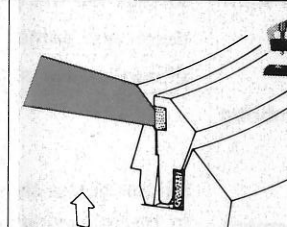
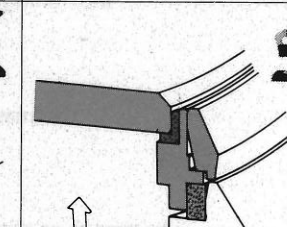
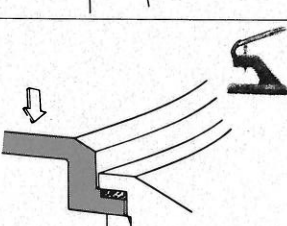
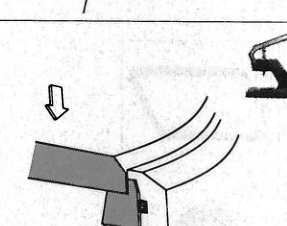
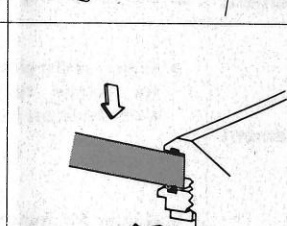
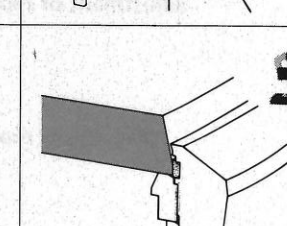
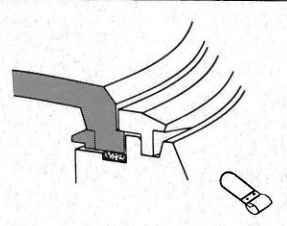
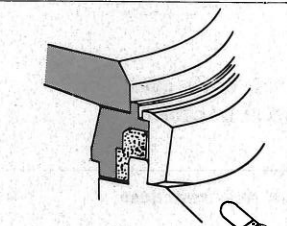
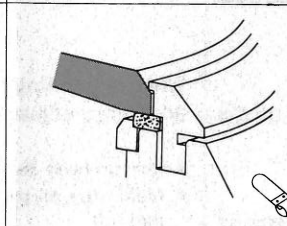
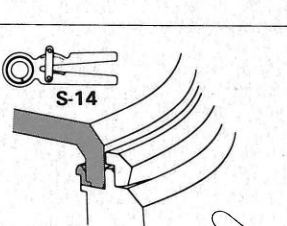
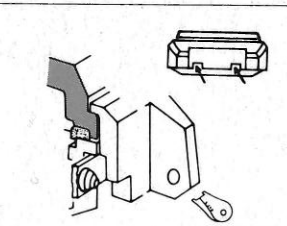
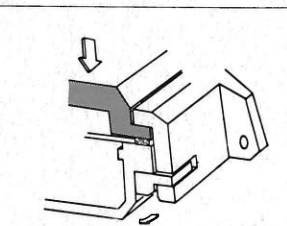
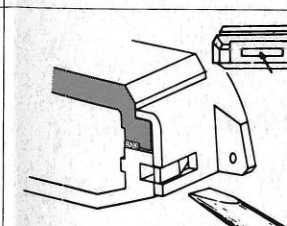
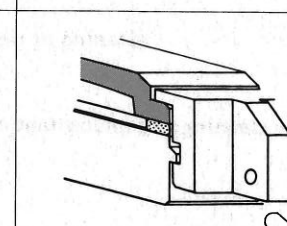
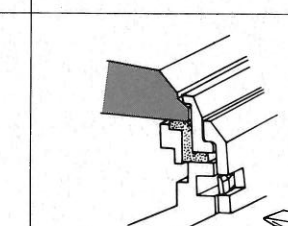
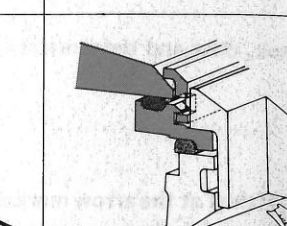
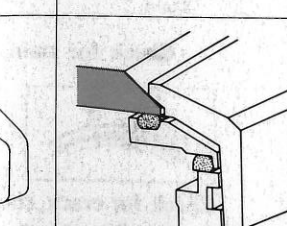
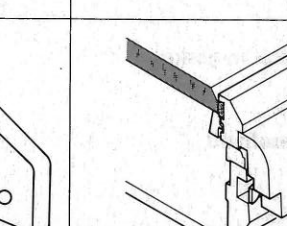
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6106-810	A-1	Screw-1	6117-800	A-1	Screw-1	6119-751	A-1	Screw-7
812	F-2	Screw-4	6118-700	A-1	Screw-7	752	A-1	Screw-7
813	A-1	Screw-1	701	A-1	Screw-7	753	F-2	Screw-2
814	A-1	Screw-1	800	A-1	Screw-7	754	F-4	Screw-16
817	T-1	One-piece-1	801	A-1	Screw-7	802	A-1	Snap-3
818	F-2	Screw-4	802	F-4	Screw-16	803	A-1	Snap-3
820	F-2	Screw-2	804	A-1	Screw-7	804	A-1	Snap-3
822	F-2	Screw-2	6119-500	K-1	Square-1	807	A-1	Screw-1
823	F-2	Screw-2	540	S-1	Screw-10	808	A-1	Screw-1
840	A-1	Screw-1	541	S-1	Screw-10	809	A-1	Screw-1
841	F-2	Screw-4	542	S-1	Screw-10	810	A-1	Snap-3
842	A-1	Screw-1	543	S-1	Screw-10	812	F-2	Screw-4
843	A-1	Screw-1	544	K-1	Square-1	813	F-2	Screw-4
844	F-2	Screw-4	545	S-1	Screw-10	814	F-2	Screw-4
845	F-2	Screw-4	546	K-1	Square-1	816	A-1	Screw-1
846	A-1	Screw-1	547	K-1	Square-1	819	T-1	One-piece-1
847	A-1	Screw-1	548	K-1	Square-1	820	A-1	Screw-1
848	A-1	Screw-1	549	S-1	Screw-10	822	F-2	Screw-2
849	T-1	One-piece-1	550	S-1	Screw-10	823	A-1	Snap-3
850	T-1	One-piece-1	551	S-1	Screw-10	824	F-2	Screw-2
851	F-2	Screw-9	552	K-1	Square-1	825	A-1	Snap-3
852	F-2	Screw-9	553	K-1	Square-1	827	F-2	Screw-2
853	A-1	Screw-1	600	A-1	Screw-1	828	A-1	Screw-1
856	F-2	Screw-2	601	A-1	Snap-3	829	A-1	Screw-1
857	A-1	Screw-1	602	F-2	Screw-2	830	F-2	Screw-4
858	A-1	Screw-1	603	A-1	Snap-3	831	F-2	Screw-2
859	A-1	Screw-1	604	A-1	Snap-3	840	F-2	Screw-2
860	A-1	Screw-1	605	F-2	Screw-9	841	A-1	Screw-1
861	A-1	Screw-1	640	F-2	Screw-2	843	A-1	Screw-1
862	T-1	One-piece-1	641	A-1	Screw-1	844	A-1	Screw-1
863	G-1	Screw-14	700	A-1	Snap-3	845	F-2	Screw-2
864	G-1	Screw-14	701	A-1	Snap-3	846	A-1	Screw-1
866	F-4	Screw-16	702	A-1	Snap-3	847	A-1	Screw-1
867	F-4	Screw-16	703	A-1	Snap-3	848	A-1	Screw-1
868	F-4	Screw-16	704	A-1	Snap-3	849	A-1	Screw-1
870	F-4	Screw-16	708	A-1	Screw-1	850	T-1	One-piece-1
871	A-1	Screw-7	709	A-1	Screw-1	851	A-1	Screw-1
872	A-1	Screw-7	710	A-1	Screw-1	852	T-1	One-piece-1
873	A-1	Screw-7	712	A-1	Screw-1	853	A-1	Screw-1
874	F-4	Screw-16	713	A-1	Screw-1	854	F-2	Screw-2
875	F-4	Screw-16	714	A-1	Screw-1	855	G-2	Screw-14
876	F-4	Screw-16	715	A-1	Screw-1	856	F-4	Screw-16
900	T-1	One-piece-1	716	F-2	Screw-2	857	A-1	Screw-7
901	T-1	One-piece-1	717	F-2	Screw-4	858	F-4	Screw-16
903	T-1	One-piece-1	718	F-2	Screw-2	859	A-1	Screw-7
904	T-1	One-piece-1	740	A-1	Screw-1	860	A-1	Screw-7
905	T-1	One-piece-1	741	T-1	One-piece-1	861	A-1	Screw-7
6109-800	A-1	Screw-7	742	T-1	One-piece-1	862	F-4	Screw-16
801	A-1	Screw-7	743	F-3	Screw-12	863	F-4	Screw-16
802	A-1	Screw-7	745	A-1	Screw-1	941	T-1	One-piece-1
6117-601	A-1	Screw-3	746	F-3	Screw-12	942	T-1	One-piece-1
640	A-1	Screw-3	747	F-3	Screw-12	6138-001	F-2	Screw-2
641	A-1	Screw-3	748	A-1	Screw-1	002	F-2	Screw-2
642	A-1	Screw-3	750	A-1	Screw-7	003	F-2	Screw-2

Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.
6138-3001	G-1	Screw-14	6205-892	F-1	Screw-5	6222-700	F-1	Screw-6
3000	G-1	Screw-14	893	F-1	Screw-5	702	T-1	One-piece-1
004	F-2	Screw-2	894	F-1	Screw-5	703	T-1	One-piece-1
3002	F-3	Screw-12	895	F-1	Screw-5	706	T-1	One-piece-1
3005	F-3	Screw-12	896	F-1	Screw-5	800	F-1	Snap-2
700	A-1	Screw-1	897	F-1	Screw-5	896	F-1	Screw-5
800	G-1	Screw-14	996	F-1	Screw-5	897	F-1	Screw-5
801	F-2	Screw-2	6206-800	F-1	Screw-5	899	F-1	Screw-5
802	A-1	Screw-2	801	F-1	Screw-5	900	F-1	Snap-2
803	F-4	Screw-16	802	F-1	Screw-6	999	F-1	Screw-5
6139-600	F-2	Screw-2	803	F-1	Screw-5	6245-900	A-1	Screw-7
601	F-2	Screw-2	804	F-1	Screw-6	6246-900	A-1	Screw-7
602	A-1	Screw-3	805	F-1	Screw-6	901	A-1	Screw-7
603	F-2	Screw-2	806	F-1	Screw-6	6300-600	A-1	Screw-7
604	F-2	Screw-2	807	A-1	Screw-7	800	A-1	Screw-7
700	F-2	Screw-2	808	A-1	Screw-7	6306-800	G-3	Screw-20
701	F-2	Screw-2	809	A-1	Screw-7	801	G-3	Screw-20
702	F-2	Screw-2	810	A-1	Screw-7	6308-500	S-1	Screw-10
703	G-1	Screw-14	811	A-1	Screw-7	700	A-1	Screw-7
705	F-3	Screw-12	812	F-1	Screw-6	800	A-1	Screw-7
706	F-2	Screw-2	813	A-1	Screw-7	801	A-1	Screw-7
707	F-3	Screw-12	814	F-1	Screw-5	802	A-1	Screw-7
708	A-1	Screw-1	815	F-1	Screw-6	803	F-4	Screw-14
710	F-4	Screw-16	816	A-1	Screw-7	6309-500	K-1	Square-1
800	F-2	Screw-2	817	A-1	Screw-7	501	S-1	Screw-10
801	G-2	Screw-14	818	F-1	Screw-6	502	S-1	Screw-10
802	A-1	Screw-1	819	A-1	Screw-7	503	K-1	Square-1
803	A-1	Screw-1	898	F-1	Screw-5	505	S-1	Screw-10
804	F-4	Screw-16	899	F-1	Snap-2	506	S-1	Screw-10
805	F-4	Screw-16	900	F-1	Screw-5	507	G-2	Screw-14
6145-800	A-1	Screw-1	6216-900	F-1	Screw-6	509	K-1	Square-1
803	A-1	Screw-1	901	A-1	Screw-7	600	F-2	Screw-2
805	F-3	Screw-12	6217-700	F-1	Snap-2	601	G-2	Screw-14
6146-800	A-1	Screw-1	701	F-1	Screw-6	700	F-4	Screw-16
803	A-1	Screw-1	800	A-1	Screw-7	703	F-2	Screw-2
804	A-1	Screw-1	6218-800	F-5	Screw-8	704	150m Diver	
805	F-3	Screw-12	801	F-1	Screw-6	705	A-1	Screw-7
6155-800	G-1	Screw-14	895	A-1	Screw-1	706	F-2	Screw-2
6156-800	G-1	Screw-14	897	A-1	Screw-1	800	A-1	Screw-7
801	G-1	Screw-14	6220-700	F-1	Screw-6	801	A-1	Screw-7
802	A-1	Screw-1	701	F-1	Screw-6	802	A-1	Screw-7
803	F-4	Screw-16	707	T-1	One-piece-1	803	A-1	Screw-7
804	G-3	Snap-4	708	T-1	One-piece-1	804	A-1	Screw-7
6201-700	F-1	Screw-5	710	T-1	One-piece-1	805	A-1	Screw-7
701	F-1	Screw-5	711	T-1	One-piece-1	806	F-4	Screw-16
702	F-1	Screw-5	714	T-1	One-piece-1	807	G-2	Screw-14
893	F-1	Snap-2	801	F-1	Snap-2	808	A-1	Screw-7
894	F-1	Screw-5	897	F-1	Screw-5	809	F-4	Screw-16
895	F-1	Snap-2	898	F-1	Screw-5	811	A-1	Screw-7
896	F-1	Screw-5	899	F-1	Screw-5	812	F-4	Screw-14
6205-700	F-1	Screw-5	900	F-1	Snap-2	813	A-1	Screw-7
701	F-1	Screw-5	997	F-1	Snap-2	814	A-1	Screw-7
798	F-1	Screw-5	998	F-1	Screw-5	815	A-1	Screw-7
800	F-1	Screw-6	999	F-1	Snap-2	816	A-1	Screw-7

Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.	Case No.	Tech. Guide Category/ Type No.	Index No.
7019-718	S-2	Screw-15	7605-800	F-1	Screw-5	7625-896	F-1	Snap-2
719	A-1	Screw-7	801	F-1	Screw-5	900	F-1	Screw-5
720	A-1	Screw-7	7606-700	F-1	Snap-2	901	F-1	Screw-5
721	F-3	Screw-12	796	F-1	Snap-2	902	A-1	Screw-7
722	F-3	Screw-12	797	F-1	Snap-2	903	A-1	Screw-7
723	F-3	Screw-12	798	F-1	Snap-2	8305-100	F-1	Screw-6
724	F-3	Screw-12	799	F-1	Snap-2	101	F-1	Screw-6
725	F-3	Screw-12	7619-700	F-1	Snap-2	801	A-1	Screw-7
726	F-3	Screw-12	701	F-1	Snap-2	802	A-1	Screw-7
727	F-3	Screw-12	702	F-1	Snap-2	803	T-1	One-piece-1
728	F-3	Screw-12	703	F-1	Snap-2	804	T-1	One-piece-1
729	F-3	Screw-12	704	F-1	Snap-2	805	T-1	One-piece-1
730	F-3	Screw-12	705	F-1	Snap-2	806	T-1	One-piece-1
731	F-4	Screw-16	706	F-1	Snap-2	900	F-1	Screw-6
732	F-4	Screw-16	707	F-1	Snap-2	8306-100	F-1	Screw-6
733	F-4	Screw-16	801	F-1	Snap-2	700	A-1	Screw-7
734	F-4	Screw-16	898	F-1	Snap-2	800	F-1	Screw-6
735	F-4	Screw-16	900	F-1	Snap-2	802	T-1	One-piece-1
736	F-4	Screw-16	901	F-1	Snap-2	807	T-1	One-piece-1
737	F-4	Screw-16	902	F-1	Snap-2	809	F-5	Screw-8
738	A-1	Screw-7	903	F-1	Snap-2	810	F-1	Screw-6
739	A-1	Screw-7	904	A-1	Snap-3	900	F-1	Screw-6
741	F-4	Screw-16	906	A-1	Snap-3	903	F-5	Screw-8
742	F-4	Screw-16	907	A-1	Snap-3	905	F-5	Screw-8
800	A-1	Snap-3	7625-700	F-1	Screw-5	8325-800	F-1	Screw-6
801	A-1	Snap-3	701	F-1	Screw-5	8346-700	A-1	Screw-7
802	F-2	Screw-4	703	F-1	Screw-5	701	A-1	Screw-7
803	F-2	Screw-4	704	A-1	Screw-7	800	F-1	Screw-6
804	A-1	Snap-3	705	A-1	Screw-7	802	T-1	One-piece-1
805	A-1	Screw-7	706	A-1	Screw-7	803	F-1	Screw-6
806	A-1	Screw-7	800	F-1	Screw-5	804	F-5	Screw-8
807	A-1	Screw-7	801	F-1	Screw-5	900	F-5	Screw-8
808	A-1	Screw-7	802	F-1	Screw-5	901	F-5	Screw-8
809	A-1	Screw-7	803	F-1	Screw-5	902	F-1	Screw-6
810	A-1	Screw-7	804	F-1	Screw-5	8800-508	S-3	Screw-13
813	F-4	Screw-16	805	F-1	Snap-2	509	S-3	Screw-13
7025-500	S-1	Screw-10	806	F-1	Screw-5	510	S-3	Screw-13
501	S-1	Screw-10	807	F-1	Snap-2			
800	A-1	Screw-7	809	F-1	Snap-2			
801	A-1	Screw-7	810	F-1	Screw-5			
802	A-1	Screw-7	811	F-1	Screw-5			
803	A-1	Screw-7	812	F-1	Screw-5			
804	A-1	Screw-7	813	F-1	Snap-2			
805	A-1	Screw-7	814	F-1	Snap-2			
806	A-1	Screw-7	820	F-1	Screw-5			
807	A-1	Screw-7	823	F-1	Screw-5			
808	A-1	Screw-7	824	F-1	Screw-5			
809	A-1	Screw-11	825	A-1	Screw-7			
810	A-1	Screw-7	826	F-1	Snap-2			
811	A-1	Screw-7	827	F-1	Screw-5			
812	A-1	Screw-7	828	F-1	Screw-5			
813	A-1	Screw-7	829	F-1	Snap-2			
814	F-4	Screw-16	830	F-1	Screw-5			
7039-702	F-4	Screw-16	893	F-1	Snap-2			

Year	Month	Day	Time	Location	Activity	Remarks
1940	Jan	1	08:00	Home	Woke up	
1940	Jan	2	07:30	Home	Woke up	
1940	Jan	3	08:00	Home	Woke up	
1940	Jan	4	07:45	Home	Woke up	
1940	Jan	5	08:00	Home	Woke up	
1940	Jan	6	07:30	Home	Woke up	
1940	Jan	7	08:00	Home	Woke up	
1940	Jan	8	07:45	Home	Woke up	
1940	Jan	9	08:00	Home	Woke up	
1940	Jan	10	07:30	Home	Woke up	
1940	Jan	11	08:00	Home	Woke up	
1940	Jan	12	07:45	Home	Woke up	
1940	Jan	13	08:00	Home	Woke up	
1940	Jan	14	07:30	Home	Woke up	
1940	Jan	15	08:00	Home	Woke up	
1940	Jan	16	07:45	Home	Woke up	
1940	Jan	17	08:00	Home	Woke up	
1940	Jan	18	07:30	Home	Woke up	
1940	Jan	19	08:00	Home	Woke up	
1940	Jan	20	07:45	Home	Woke up	
1940	Jan	21	08:00	Home	Woke up	
1940	Jan	22	07:30	Home	Woke up	
1940	Jan	23	08:00	Home	Woke up	
1940	Jan	24	07:45	Home	Woke up	
1940	Jan	25	08:00	Home	Woke up	
1940	Jan	26	07:30	Home	Woke up	
1940	Jan	27	08:00	Home	Woke up	
1940	Jan	28	07:45	Home	Woke up	
1940	Jan	29	08:00	Home	Woke up	
1940	Jan	30	07:30	Home	Woke up	
1940	Jan	31	08:00	Home	Woke up	
1940	Feb	1	07:45	Home	Woke up	
1940	Feb	2	08:00	Home	Woke up	
1940	Feb	3	07:30	Home	Woke up	
1940	Feb	4	08:00	Home	Woke up	
1940	Feb	5	07:45	Home	Woke up	
1940	Feb	6	08:00	Home	Woke up	
1940	Feb	7	07:30	Home	Woke up	
1940	Feb	8	08:00	Home	Woke up	
1940	Feb	9	07:45	Home	Woke up	
1940	Feb	10	08:00	Home	Woke up	
1940	Feb	11	07:30	Home	Woke up	
1940	Feb	12	08:00	Home	Woke up	
1940	Feb	13	07:45	Home	Woke up	
1940	Feb	14	08:00	Home	Woke up	
1940	Feb	15	07:30	Home	Woke up	
1940	Feb	16	08:00	Home	Woke up	
1940	Feb	17	07:45	Home	Woke up	
1940	Feb	18	08:00	Home	Woke up	
1940	Feb	19	07:30	Home	Woke up	
1940	Feb	20	08:00	Home	Woke up	
1940	Feb	21	07:45	Home	Woke up	
1940	Feb	22	08:00	Home	Woke up	
1940	Feb	23	07:30	Home	Woke up	
1940	Feb	24	08:00	Home	Woke up	
1940	Feb	25	07:45	Home	Woke up	
1940	Feb	26	08:00	Home	Woke up	
1940	Feb	27	07:30	Home	Woke up	
1940	Feb	28	08:00	Home	Woke up	
1940	Feb	29	07:45	Home	Woke up	
1940	Feb	30	08:00	Home	Woke up	
1940	Mar	1	07:30	Home	Woke up	
1940	Mar	2	08:00	Home	Woke up	
1940	Mar	3	07:45	Home	Woke up	
1940	Mar	4	08:00	Home	Woke up	
1940	Mar	5	07:30	Home	Woke up	
1940	Mar	6	08:00	Home	Woke up	
1940	Mar	7	07:45	Home	Woke up	
1940	Mar	8	08:00	Home	Woke up	
1940	Mar	9	07:30	Home	Woke up	
1940	Mar	10	08:00	Home	Woke up	
1940	Mar	11	07:45	Home	Woke up	
1940	Mar	12	08:00	Home	Woke up	
1940	Mar	13	07:30	Home	Woke up	
1940	Mar	14	08:00	Home	Woke up	
1940	Mar	15	07:45	Home	Woke up	
1940	Mar	16	08:00	Home	Woke up	
1940	Mar	17	07:30	Home	Woke up	
1940	Mar	18	08:00	Home	Woke up	
1940	Mar	19	07:45	Home	Woke up	
1940	Mar	20	08:00	Home	Woke up	
1940	Mar	21	07:30	Home	Woke up	
1940	Mar	22	08:00	Home	Woke up	
1940	Mar	23	07:45	Home	Woke up	
1940	Mar	24	08:00	Home	Woke up	
1940	Mar	25	07:30	Home	Woke up	
1940	Mar	26	08:00	Home	Woke up	
1940	Mar	27	07:45	Home	Woke up	
1940	Mar	28	08:00	Home	Woke up	
1940	Mar	29	07:30	Home	Woke up	
1940	Mar	30	08:00	Home	Woke up	
1940	Mar	31	07:45	Home	Woke up	
1940	Apr	1	08:00	Home	Woke up	
1940	Apr	2	07:30	Home	Woke up	
1940	Apr	3	08:00	Home	Woke up	
1940	Apr	4	07:45	Home	Woke up	
1940	Apr	5	08:00	Home	Woke up	
1940	Apr	6	07:30	Home	Woke up	
1940	Apr	7	08:00	Home	Woke up	
1940	Apr	8	07:45	Home	Woke up	
1940	Apr	9	08:00	Home	Woke up	
1940	Apr	10	07:30	Home	Woke up	
1940	Apr	11	08:00	Home	Woke up	
1940	Apr	12	07:45	Home	Woke up	
1940	Apr	13	08:00	Home	Woke up	
1940	Apr	14	07:30	Home	Woke up	
1940	Apr	15	08:00	Home	Woke up	
1940	Apr	16	07:45	Home	Woke up	
1940	Apr	17	08:00	Home	Woke up	
1940	Apr	18	07:30	Home	Woke up	
1940	Apr	19	08:00	Home	Woke up	
1940	Apr	20	07:45	Home	Woke up	
1940	Apr	21	08:00	Home	Woke up	
1940	Apr	22	07:30	Home	Woke up	
1940	Apr	23	08:00	Home	Woke up	
1940	Apr	24	07:45	Home	Woke up	
1940	Apr	25	08:00	Home	Woke up	
1940	Apr	26	07:30	Home	Woke up	
1940	Apr	27	08:00	Home	Woke up	
1940	Apr	28	07:45	Home	Woke up	
1940	Apr	29	08:00	Home	Woke up	
1940	Apr	30	07:30	Home	Woke up	
1940	Apr	30	08:00	Home	Woke up	

Glass & bezel construction

Case back type	Category	How to open the glass portion	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6	TYPE 7	TYPE 8
Snap, Screw, Screw ring	A	Remove glass by pushing up from the inside.								
	F	Remove bezel to remove glass.								
	G	Remove glass by pushing up from the inside.								
	S	Remove glass by pushing down from the top.								
One-piece	B	Remove bezel to remove glass. Movement is only removed from top of case.								
	T	Remove bezel. Then use one-piece case opener to remove glass. Movement is only removed from top of case.								
Square	K	Remove glass by opening case.								

Remarks: The shadowed parts in the above diagram show the supplying unit for servicing parts of the glass and glass with combined parts. Since more than two shadowed parts make up one combined part, it is not necessary to disassemble them for repair servicing and they are supplied as a single unit.

Case repair check points

CHECK POINTS	IMPERFECTION	TYPE OF REPAIR NECESSARY	How to clean the gasket
① Case back portion		reassembling	<p>The gasket should be cleaned with alcohol <u>only</u>.</p> <p><u>Do not use</u></p> <p>benzine thinner trichlorethylen</p> <p>After cleaning the gasket with alcohol, silicon grease 500,000 c.s. should be lightly spread on the surface of the gasket. (Be careful, there are some exceptions where silicon grease should be avoided.)</p>
		cleaning or replacement	
		cleaning or replacement	
		cleaning or replacement	
② Crown portion		shortening the stem	<p>Silicon grease should not be applied to the following gaskets:</p> <ul style="list-style-type: none"> Gasket under glass for square type water-resistant case Gasket for micro-adjustor screw <p>When tightening the case back, glass and micro-adjustor screw, be careful:</p> <ul style="list-style-type: none"> Not to twist the gasket. Make sure all parts are free from dust and lint. <p>For further detailed information, please refer to the technical guide compiled by types of the case structure.</p>
		Not evenly fixed, slanting	
		adjustment or replacement	
		adjustment or replacement	
		cleaning or replacement	
		replacement of the case	
		adjustment or replacement of the case, cleaning	
		adjustment or replacement of the case, cleaning	
③ Glass portion		reassembling or replacement	
		reassembling (when/if there is a crack, replacement is required)	
		replacement of the glass, wipe off dust	
		replacement of the glass, wipe off dust	
		cleaning or replacement	
	cleaning or replacement of the case		

When repairing a SEIKO watch, use genuine SEIKO parts.

3. Action of snap ring

On the snap ring type, two projections on the snap ring press against the plate or case ring to secure the movement (Fig. 1). Consequently, when turning the snap ring and when two projections fall into respective notches on the plate, the movement can be taken out (at that moment, rotation of the snap ring becomes light). (Fig. 2)

Note: Do not detach the snap ring from caseband.

4. Operation method of snap ring

At present, SEIKO has four case types, shown as A through D in the following table. When removing the glass, carefully observe the case type to determine in which category it belongs.

When turning the snap ring, the trick of easily turning the snap ring is in applying tweezers at the correct position. Always push the snap ring at its tail portion (rear) when turning (Fig. 3).

Note) When inserting the movement, set the projection of snap ring at the C position shown in the "When securing the movement" portion of the following chart; then insert the movement.

Fig. 1

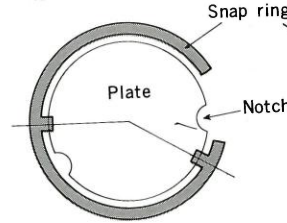
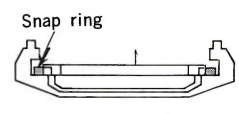
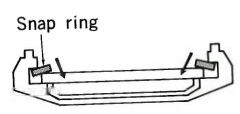
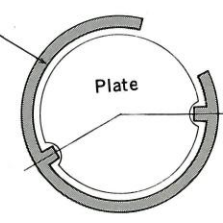


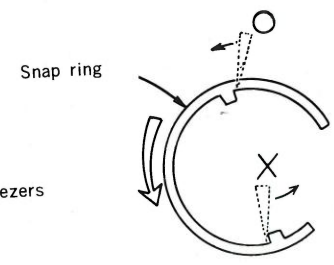
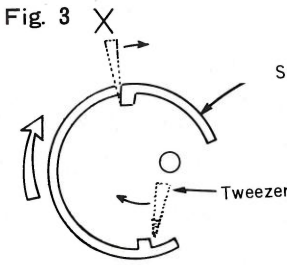
Fig. 2



Movement in secured position (projections of snap ring press the plate)

Movement in removable state (projections of the snap ring fall into notches of the plate)

Fig. 3



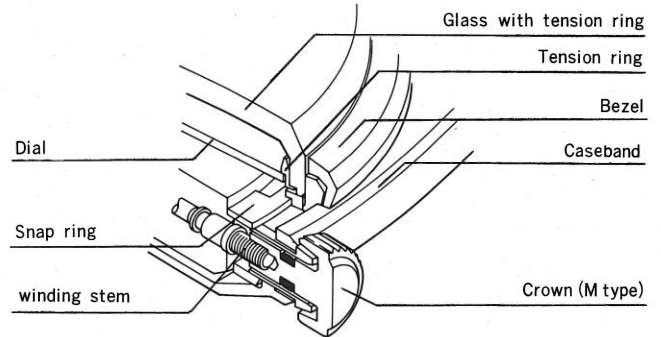
When turning to the right

When turning to the left

These two diagrams show correct and incorrect positions of tweezers when turning the snap ring.

1. Construction

Glass: Tension ring type
 Case back: One-piece type
 Crown: M type



2. Disassembling and assembling

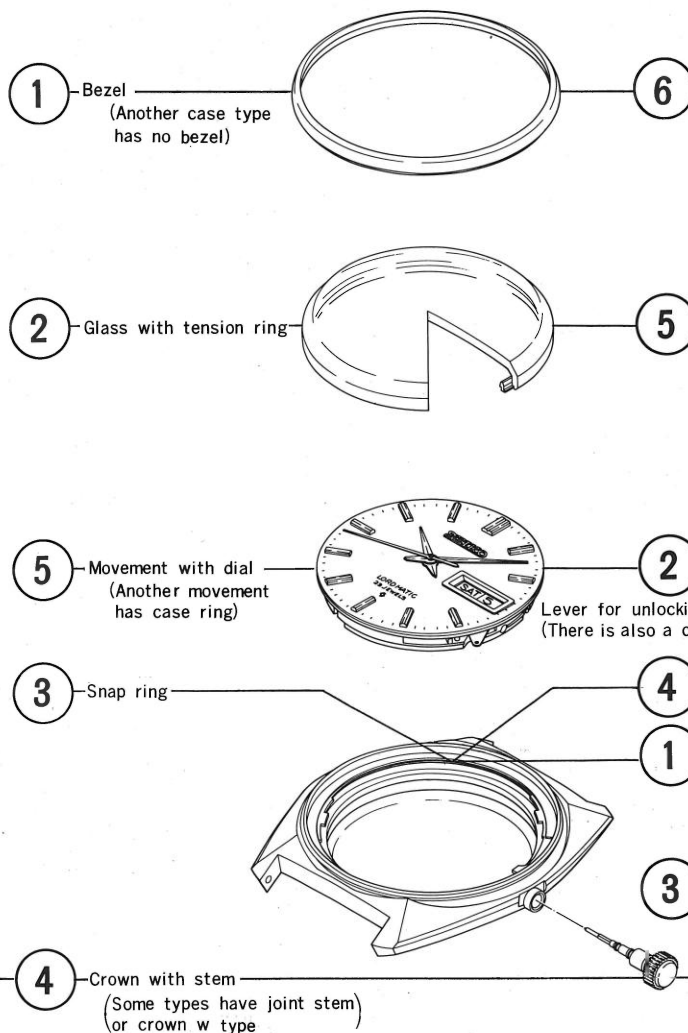
Disassembling procedures

Remove glass by using SEIKO one-piece case opener (S-12 or S-14).

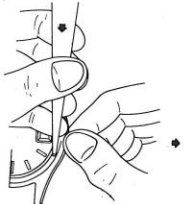
Take out the movement after turning over the watch.

Note) Previously spread out a soft cloth where the movement will drop. It will prove convenient to remember the position of the snap ring projection when reassembling the movement.

Note) Do not injure the case. Refer to next page for operating the snap ring.



Push on the unlocking lever, then remove crown.



Assembling procedures

Insert the glass with S-12 or S-14 or Waterproof case tightening tool. Note) Remove all dirt on the contacting portion between glass and case; replace scratched parts with new ones; confirm setting of glass by depressing glass circumference with a finger tip after inserting the glass.

Turn snap ring the reverse direction of Disassembling-3. (With this operation, the movement is secured.)

Note) Do not scratch the case.

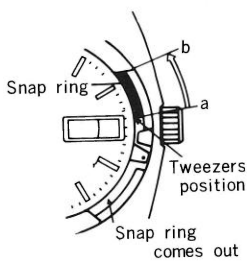
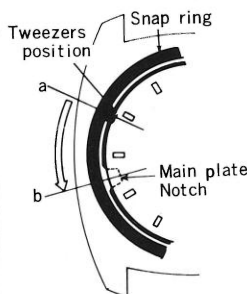
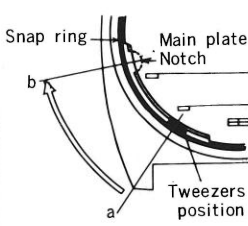
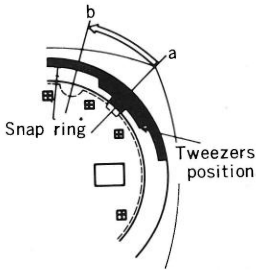
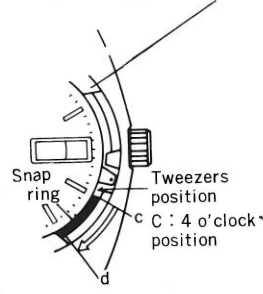
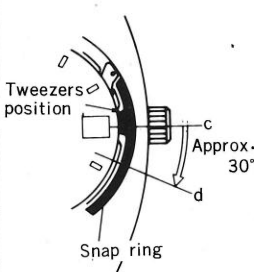
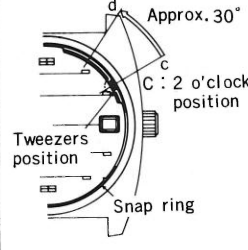
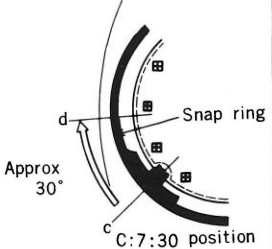
Refer to the next page for operating the snap ring.

Place projection of the snap ring in the same position as it was.

Push in the winding stem while depressing the lever for unlocking stem (on another type, simply push in the winding stem without depressing the lever for unlocking stem). Apply SEIKO's silicon grease (500,000 c.s.) to gasket.

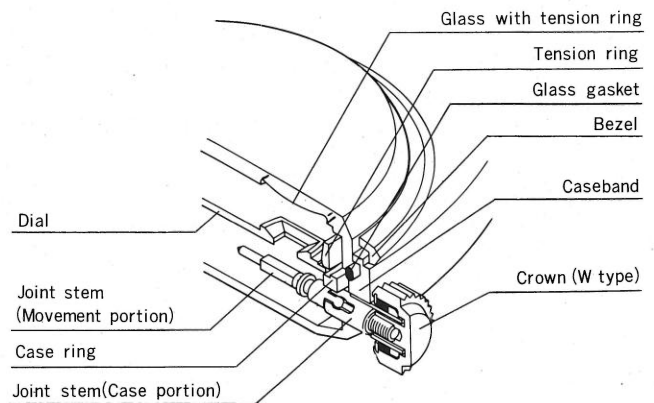
One-piece-1

Illustration of operation method of snap ring

	A	B	C	D
When taking out the movement	<p>Turn from a to b by using tweezers</p> 	<p>Use tweezers to turn the snap ring from a to b on the main plate Stop turning when revolution becomes light</p> 	<p>Use tweezers to turn the snap ring from a to b</p> 	<p>Use tweezers to turn the snap ring from a to b Stop turning when revolution becomes light</p> 
When securing the movement	<p>Use tweezers to turn the snap ring from c to d</p> <p>When turning the snap ring up to d, the other end of the snap ring will appear here</p> 	<p>Use tweezers to turn the snap ring from c to d approximately 30°</p> 	<p>Use tweezers to turn the snap ring from c to d approximately 30° Note) Do not overturn (stop turning at around 1 o'clock)</p> 	<p>Use tweezers to turn the snap ring approximately 30°</p> 

1 . Construction

Glass: Tension ring type
 Case back: One-piece type
 Crown: W type



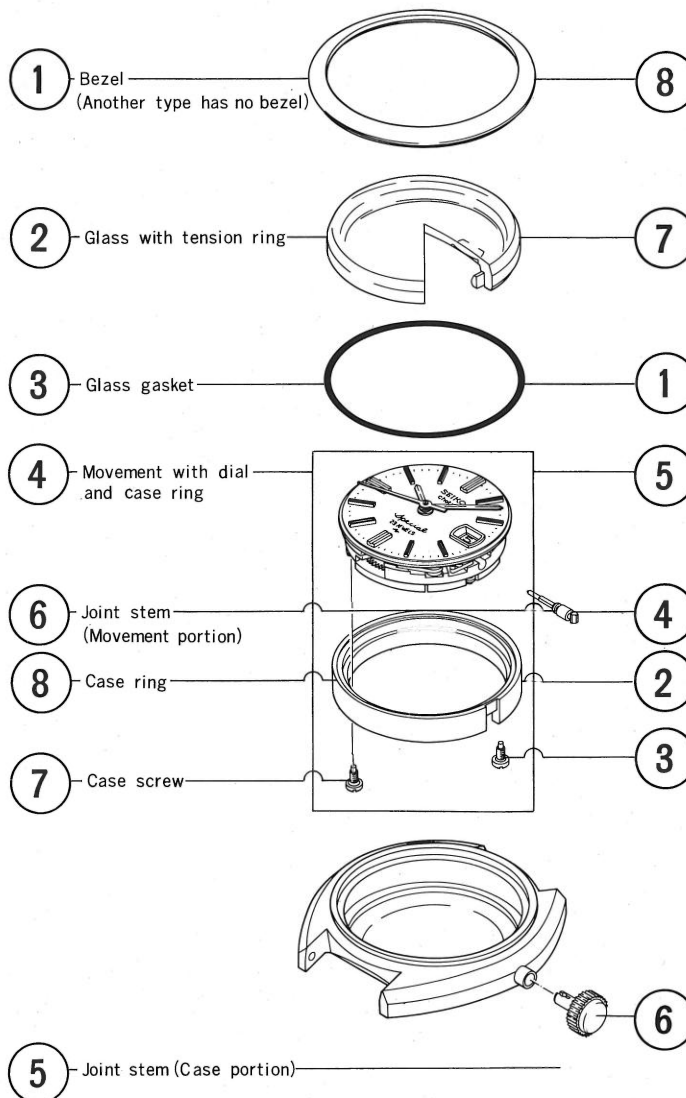
2 . Disassembling and assembling

Disassembling procedures

Remove glass by using SEIKO one-piece case opener (S-12 or S-14). Remove the glass after carefully reading the instruction Manual for SEIKO one-piece case opener.

Turn over the watch and turn crown counterclockwise then slowly take it out.

Note) Previously spread a soft cloth where the movement will drop.



Assembling procedures

Insert the glass with S-12, S-14 or Waterproof case tightening tool. Note) Remove all dirt on the contacting portion between glass and case; replace scratched parts with new ones; confirm setting of glass circumference with a finger tip after inserting the glass.

Apply silicon grease 500,000 c.s. to glass gasket.

Another case ring secures the movement by deforming the 3 o'clock side groove with a driver.

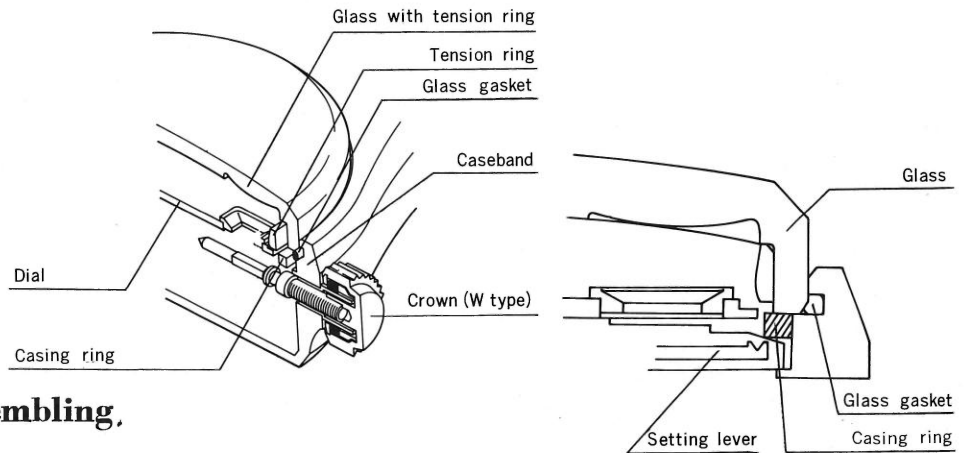
Insert crown (with joint stem) into stem tube, then turn crown counterclockwise and push in crown after confirming an audible "click".

Apply silicon grease 500,000 c.s. to crown gasket.

1 . Construction

Glass: Tension ring type
 Case back: One-piece type
 Crown: W type

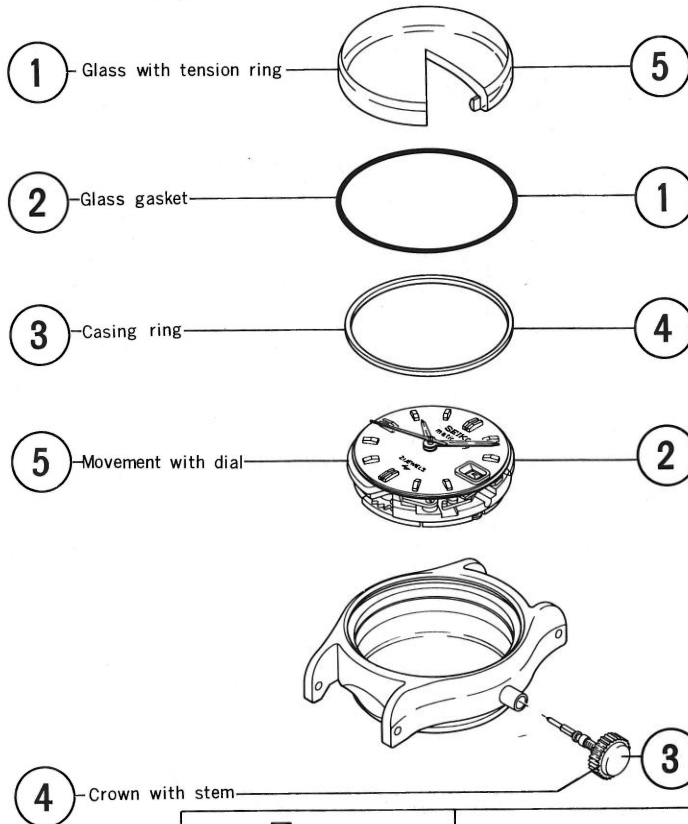
Feature is the one-piece waterproof case; movement is secured by glass through casing ring.



2 . Disassembling and assembling.

Disassembling procedures

Remove glass by using SEIKO one-piece case opener (S-12 or S-14). Remove the glass after carefully reading the instruction Manual for SEIKO one-piece case opener.

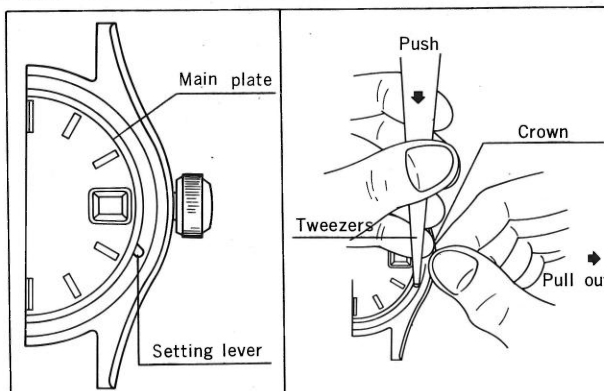


Assembling procedures

Insert the glass with S-12, S-14 or Waterproof case tightening tool. Note) Remove all dirt on the contacting portion between glass and case; replace scratched parts with new ones; confirm setting of glass circumference with a finger tip after inserting the glass.

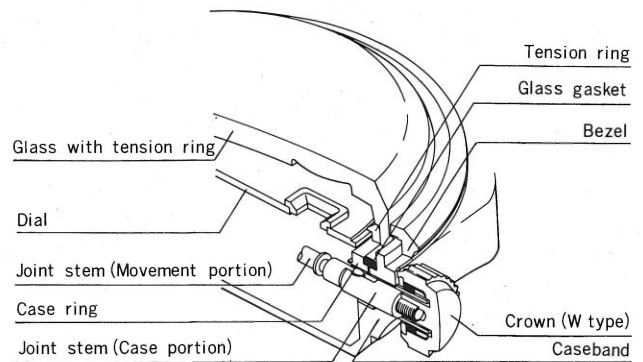
Apply silicon grease 500,000 c.s. to glass gasket.

Apply silicon grease 500,000 c.s. to crown gasket.



1. Construction

Glass: Tension ring type
 Case back: One-piece type
 Crown: W type



2. Disassembling and assembling

Disassembling procedures

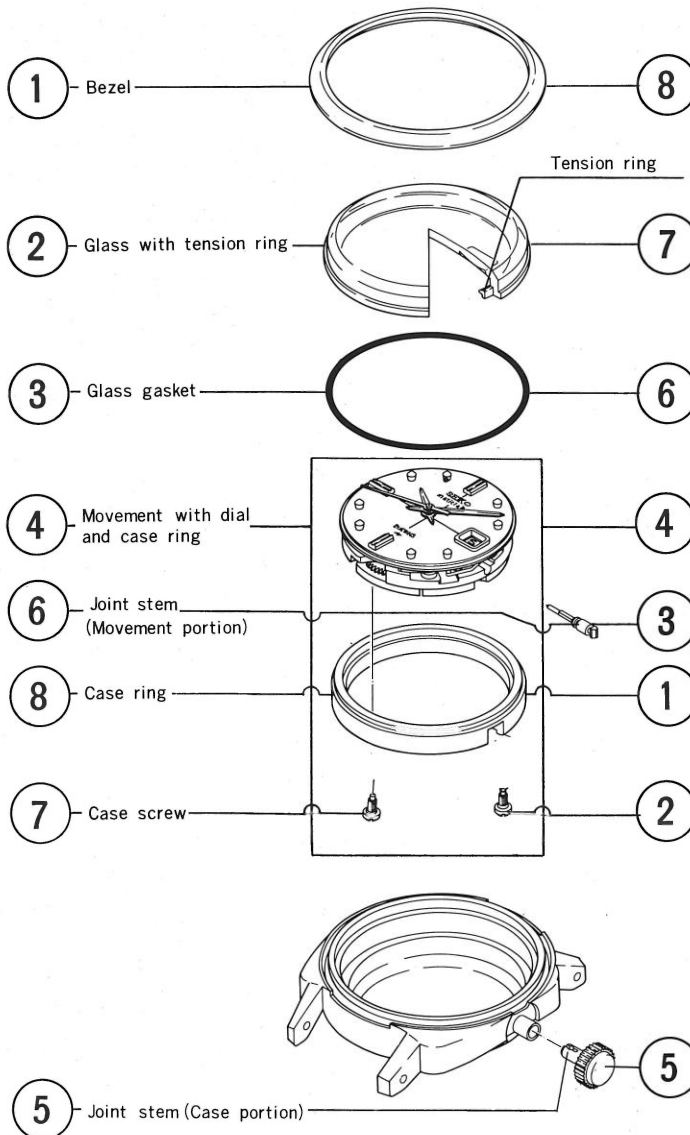
Assembling procedures

Note) Two notches for opening are provided on the 6 and 12 o'clock portions; open these portions alternately.

Do not use one-piece case opener.

Turn over the watch and turn crown counterclockwise then slowly take it out.

Note) Previously spread a soft cloth where the movement will drop.



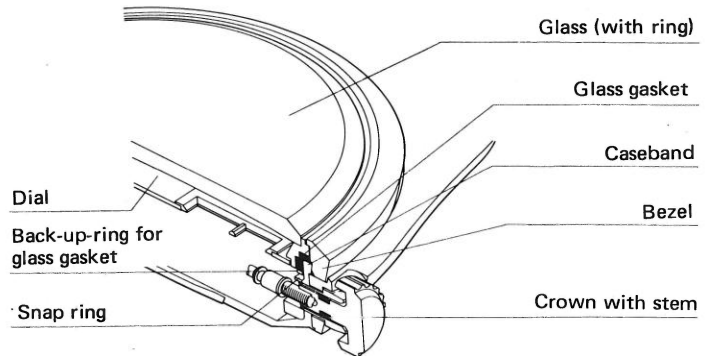
Apply silicon grease 500,000 c.s. to glass gasket.

Insert crown (with joint stem) into stem tube, then turn crown counterclockwise and push in crown after confirming an audible "click". Apply silicon grease 500,000 c.s. to crown gasket.

One-piece-5

1. Construction

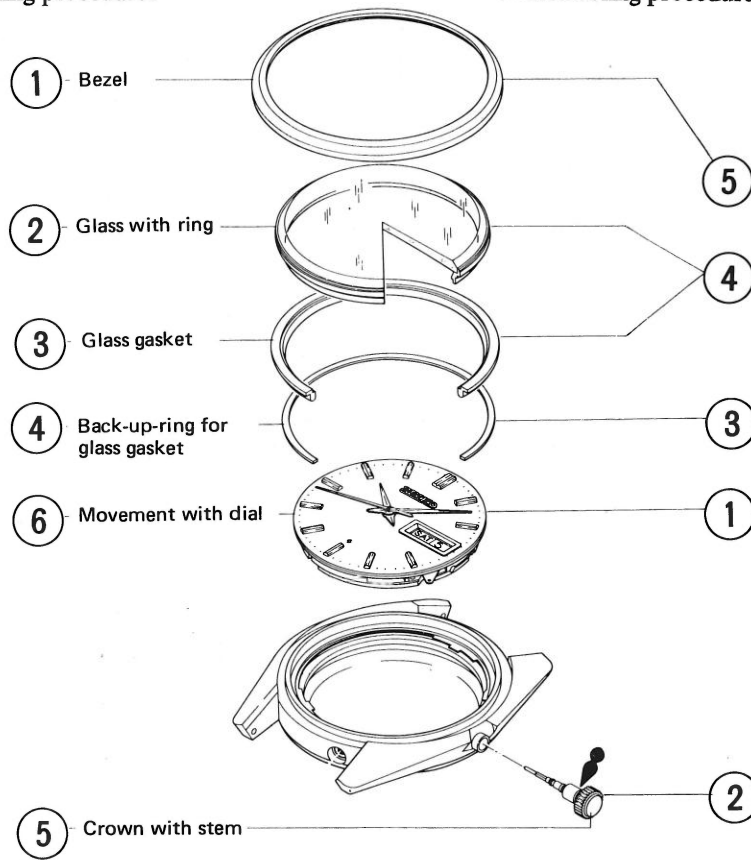
Glass: Hardlex
 Case back: One-piece type
 Crown: M type



2. Disassembling and Reassembling

Disassembling procedures

Reassembling procedures



Note: 1. Be careful not to reassemble the gasket upside down.
 2. Pay attention not to detach the glass from the ring edge.

When tightening the bezel, press it in the setting with the glass ring edge.

Reassemble the glass and gasket, then put it on the case and press it in the bezel.

Apply silicon grease 500,000 c.s. to the gasket. Applying method is the same as that of case back gasket.

Take out the movement by turning the snap ring.

1. Note: Provide a soft cushion (cloth etc.) where the movement is to be ejected.

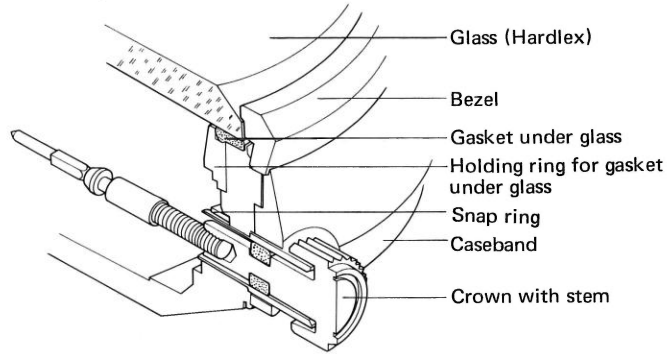
2. Apply silicon grease 500,000 c.s. to crown gasket.



One-piece-6

1. Construction of Glass Portion

The glass is fixed to the caseband with the bezel being held the holding ring for gasket and the gasket under glass.



2. Disassembling and reassembling

Note:

How to remove the glass

Remove the bezel by pushing with the case opener into the opening notch and then the glass can be removed.

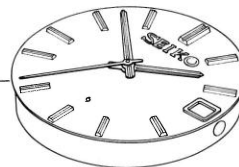
Disassembling procedures

- ① Bezel
- ② Glass
- ③ Gasket under glass
- ④ Holding ring for gasket under glass

Reassembling procedures

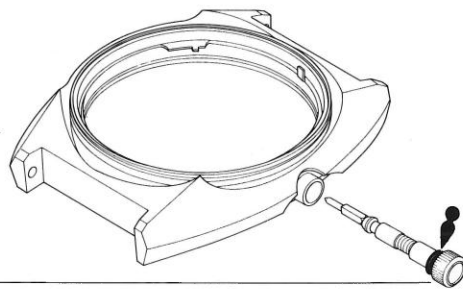
- ⑥
- ⑤
- ④
- ③

- ⑥ Movement with dial

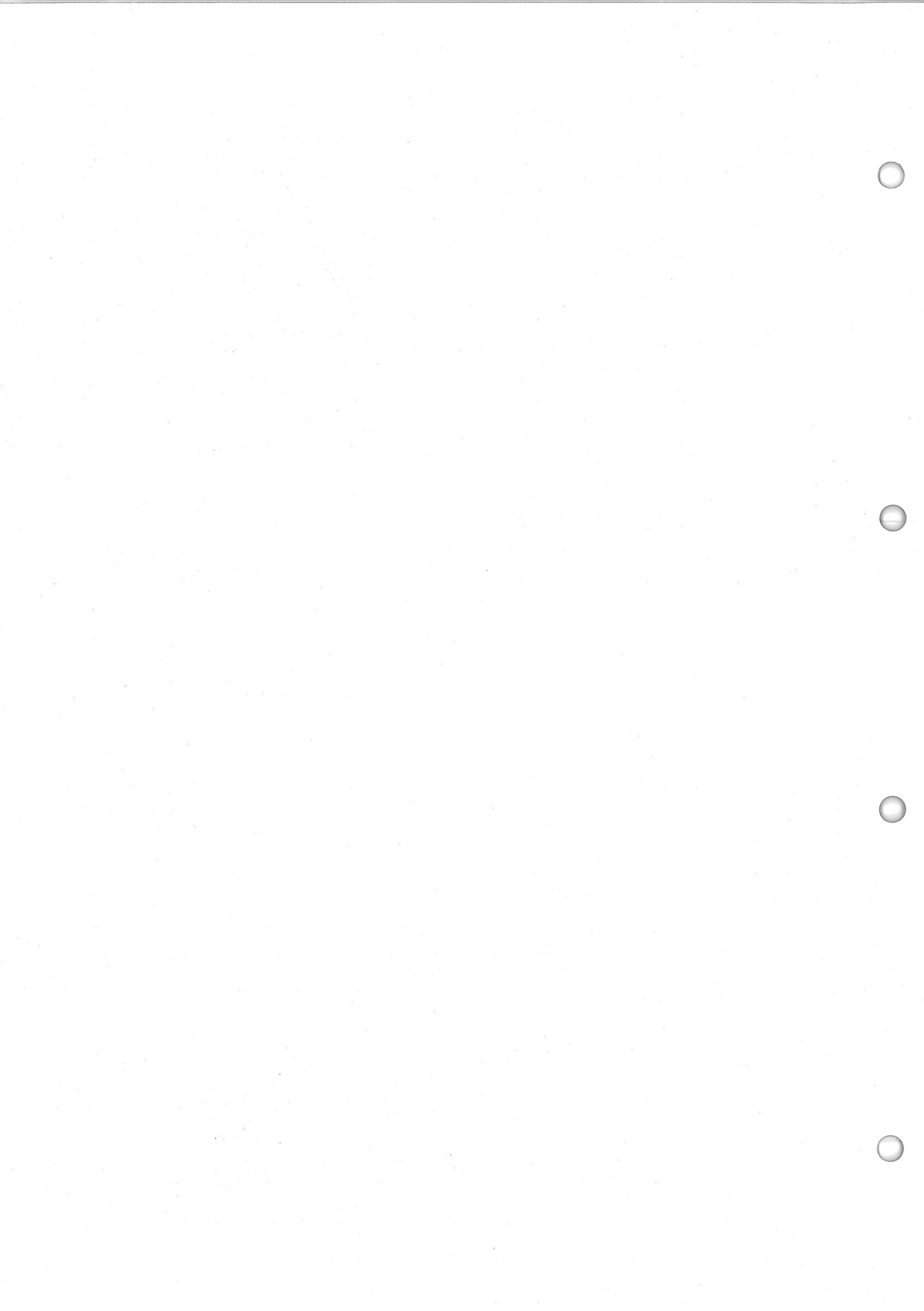


- ①

- ⑤ Crown with stem



- ②



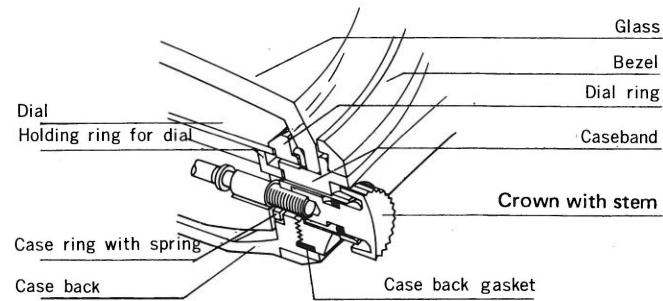
Screw-1

1. Construction

Glass: Tension ring type

Case back: Screw type

Crown: M type



2. Disassembling and Reassembling

Disassembling procedures

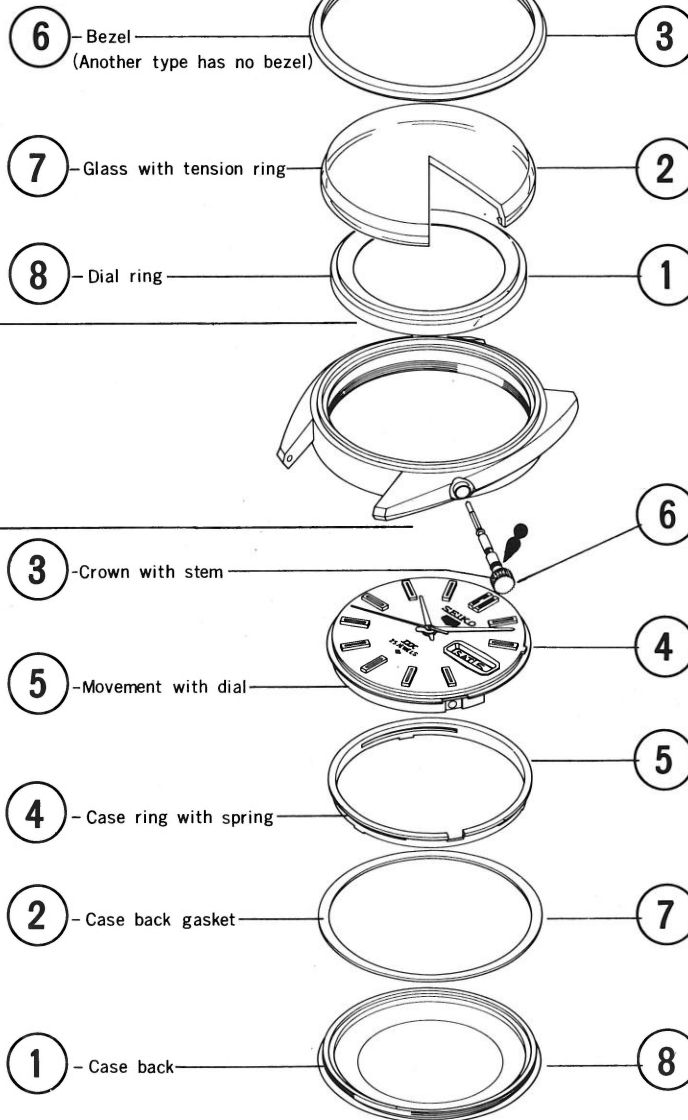
Reassembling procedures

Detach the glass with tension ring by pushing it outward from the inner side.

Disassemble only when changing the glass. (⑥-⑧)

Disassemble when adjusting or repairing the movement. (①-⑤)

Another screw type has a case spring on the case ring. It is unnecessary to remove the spring from the case ring.



Use SEIKO water-resistant case tightening tool.

Do not use one-piece case opener.

Another case type has no dial ring

Apply silicon grease 500,000 c.s. to the crown gasket.

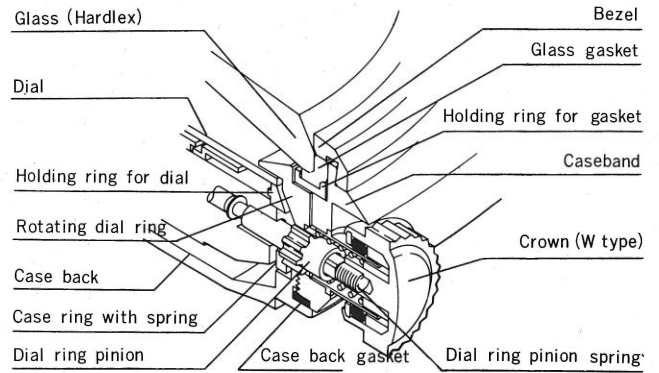
Note) Set the projection of dial and the groove of dial ring.

Note) 1. Replace gasket when scratched or deformed.
2. Insert gasket into the groove of case back when reassembling.
3. Apply silicon grease 500,000 c.s. to case back gasket.

1. Construction

Glass: Hardlex
 Case back: Screw type
 Crown: W type

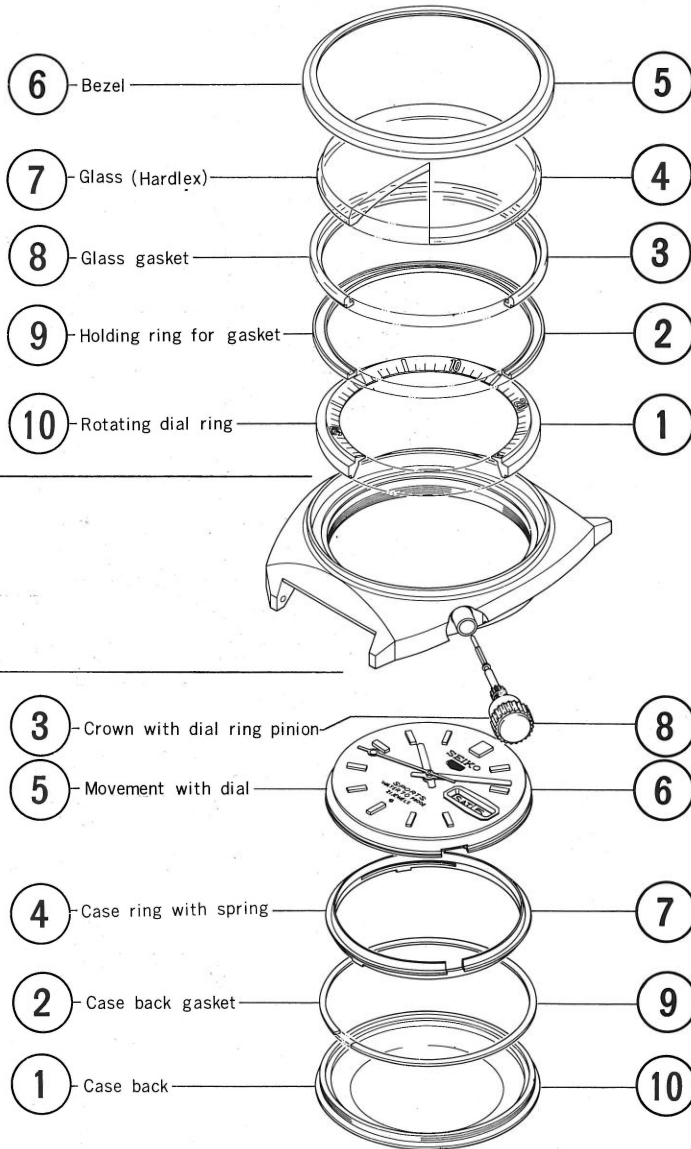
(Additional mechanism): Rotating ring



2. Disassembling and assembling

Disassembling procedures

Assembling procedures



Disassemble only when changing glass. (6~10)

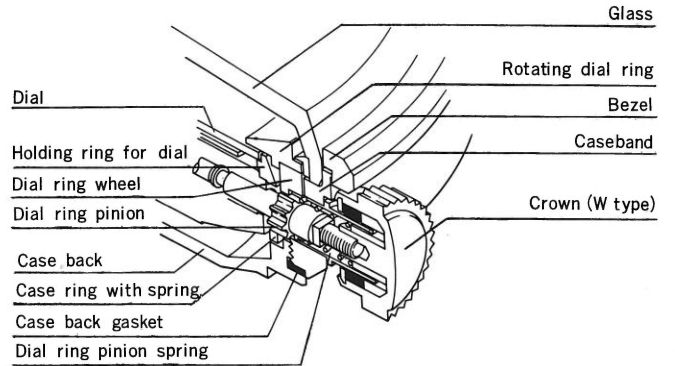
Disassemble when adjusting or repairing movement. (1~5)

Note) 1. Apply silicon grease 500,000 c.s. to crown gasket.
 2. Insert the crown while interlocking dial ring pinion with rotating dial ring.

Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of case back when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

1. Construction

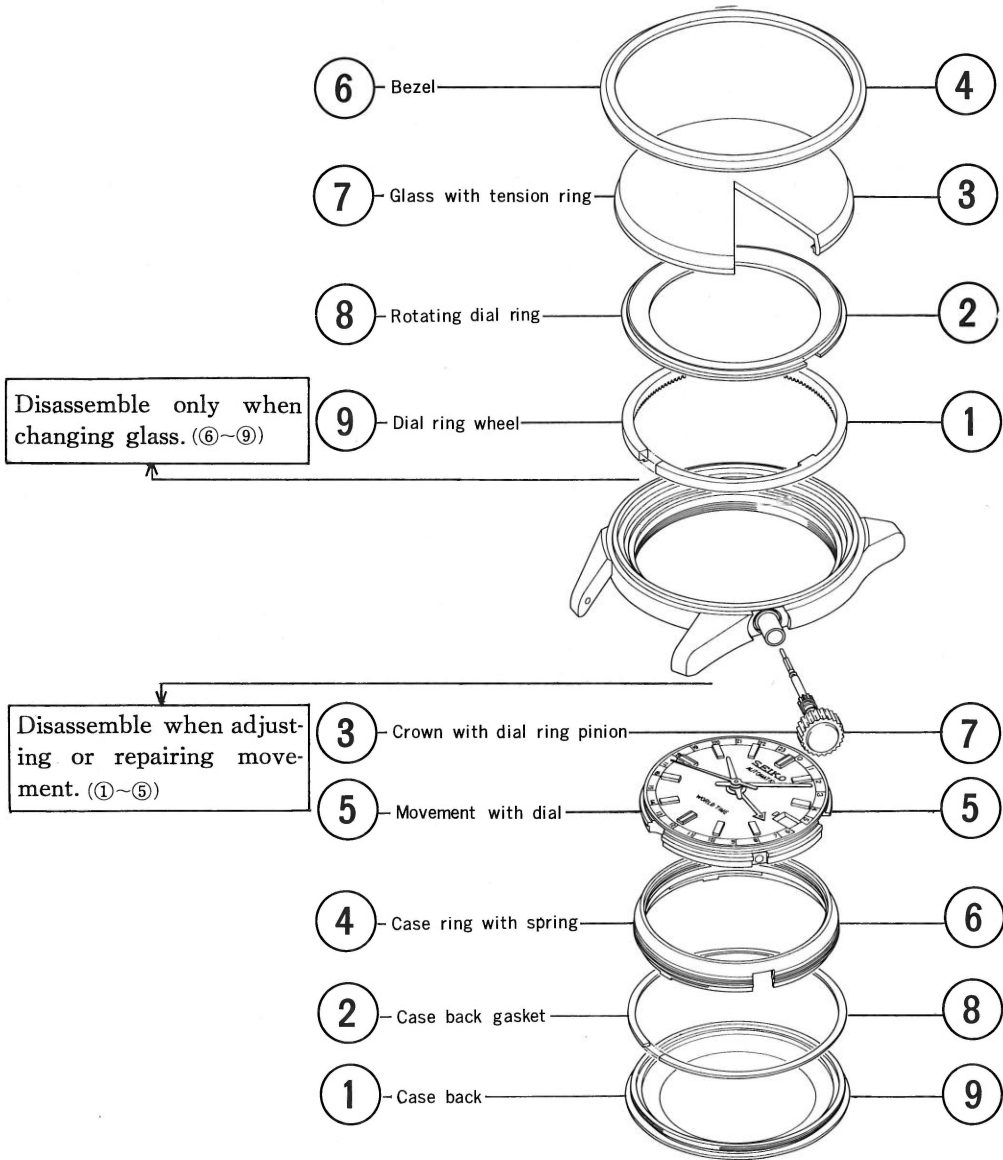
Glass: Tension ring type
 Case back: Screw type
 Crown: W type
 (Additional mechanism): Rotating dial ring



2. Disassembling and assembling

Disassembling procedures

Assembling procedures



Disassemble only when changing glass. (6~9)

Disassemble when adjusting or repairing movement. (1~5)

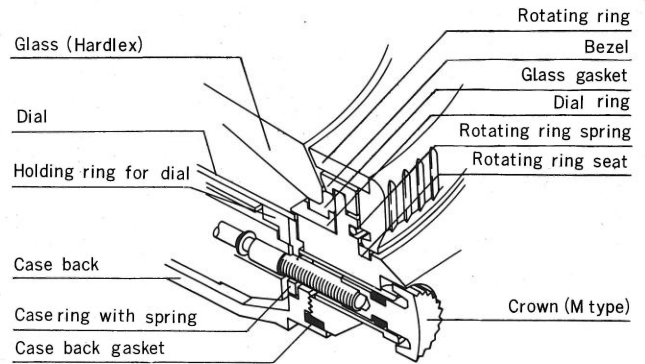
Set the groove of rotating dial ring to the projection of dial ring wheel. Insert the pin of rotating dial to the hole of dial ring wheel.

Note) 1. Apply silicon grease 500,000 c.s. to crown gasket.
 2. Insert the crown while interlocking dial ring pinion with rotating dial ring.

Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of case back when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

1. Construction

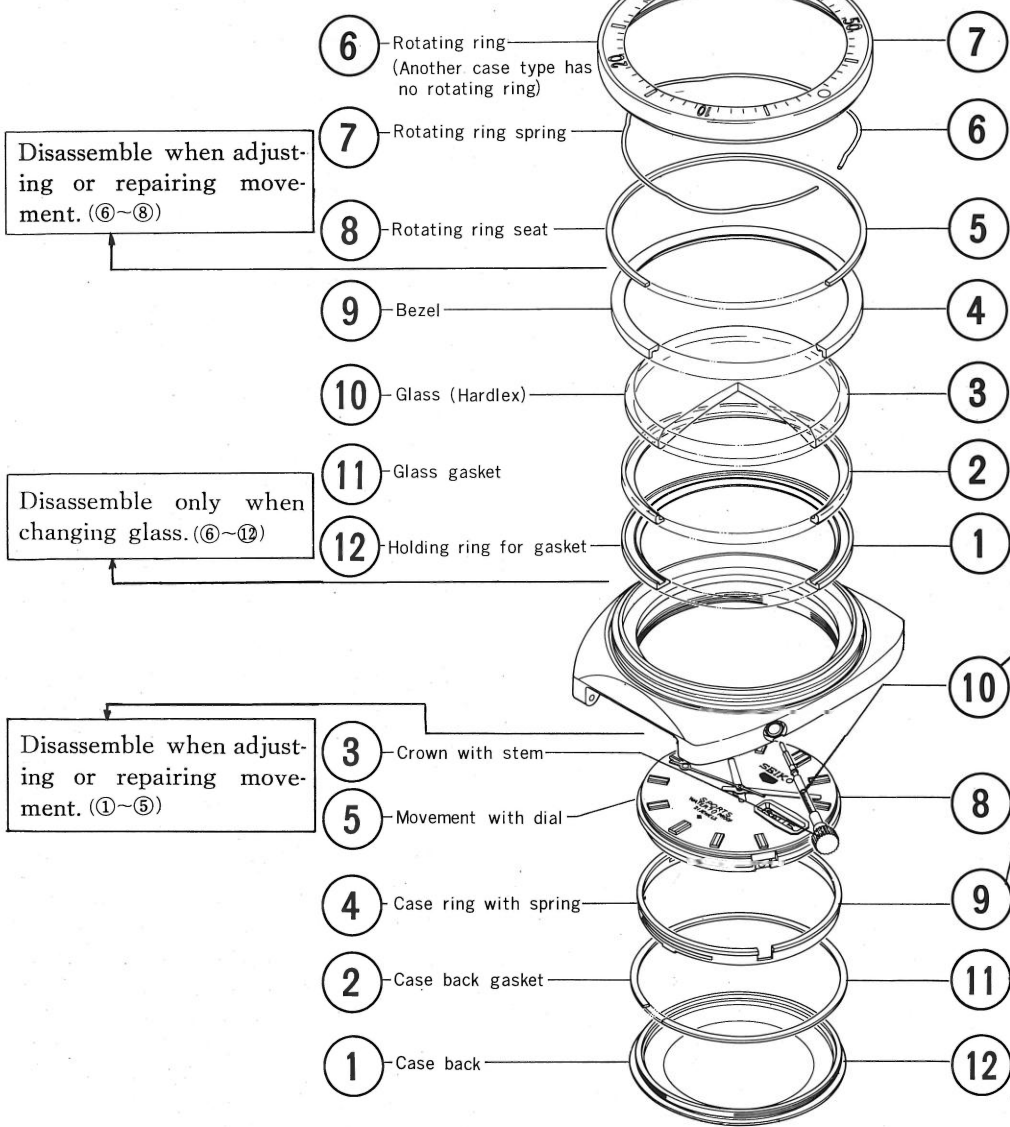
Glass: Hardlex
 Case back: Screw type
 Crown: M type
 (Additional mechanism): Rotating ring



2. Disassembling and assembling

Disassembling procedures

Assembling procedures



Disassemble when adjusting or repairing movement. (6~8)

Disassemble only when changing glass. (6~12)

Disassemble when adjusting or repairing movement. (1~5)

Inserting method of rotating ring

- (1) Insert rotating ring into case groove.
- (2) Hook rotating ring to one corner of rotating ring spring, then gradually press in rotating ring spring by using a case opener in the condition that rotating ring is depressed. By doing so, rotating ring can be set.

[When rotating ring is easily removed]

Bend three projected portions of rotating ring to the outside as shown by the dotted line.



Note) Apply silicon grease 500 000 c.s. to crown gasket.

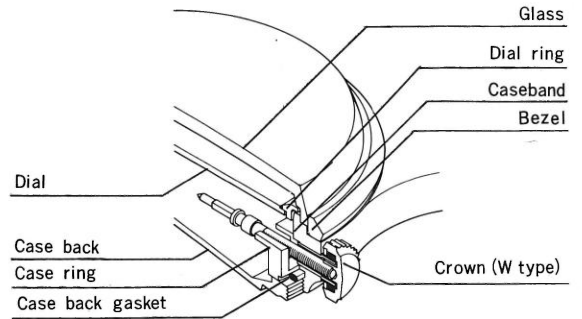
Besides, there are casing clamp or case screw types. Assemble the dialed movement to case ring, then insert case ring into caseband.

Assemble after inserting gasket into case back groove. Another type assemble after inserting gasket into caseband groove. Replace when damaged or crushed. Apply silicon grease, 500,000 c.s. to gasket.



1 . Construction

Glass: Hooped type
 Case back: Screw type
 Crown: W type



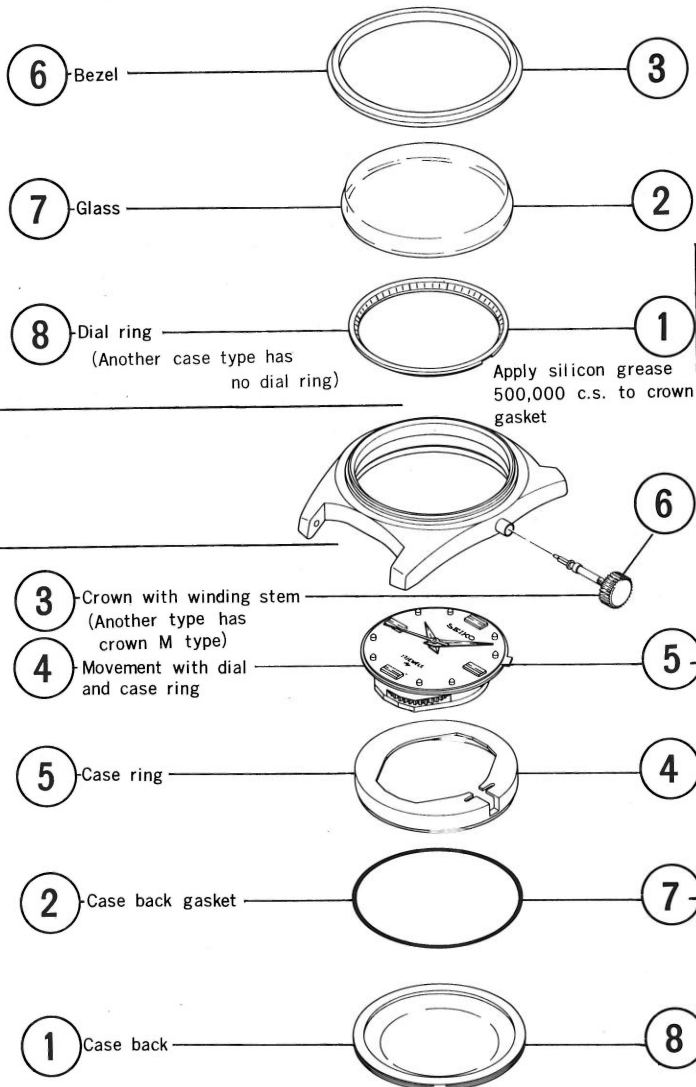
2 . Disassembling and assembling

Disassembling procedures

Assembling procedures

Disassemble only when changing glass. (6~8)

Disassemble when adjusting or repairing movement. (1~5)



Note) Set the projection of dial and the groove of dial ring.

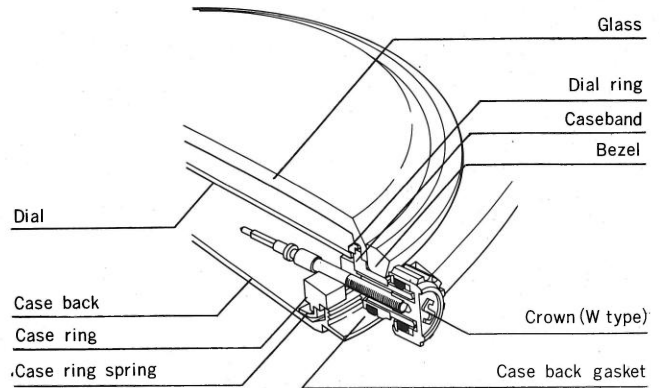
Fix the movement by bending the groove portion in the direction of the arrow.

Besides, there are casing clamp or case screw types.

Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of caseband when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

1 . Construction

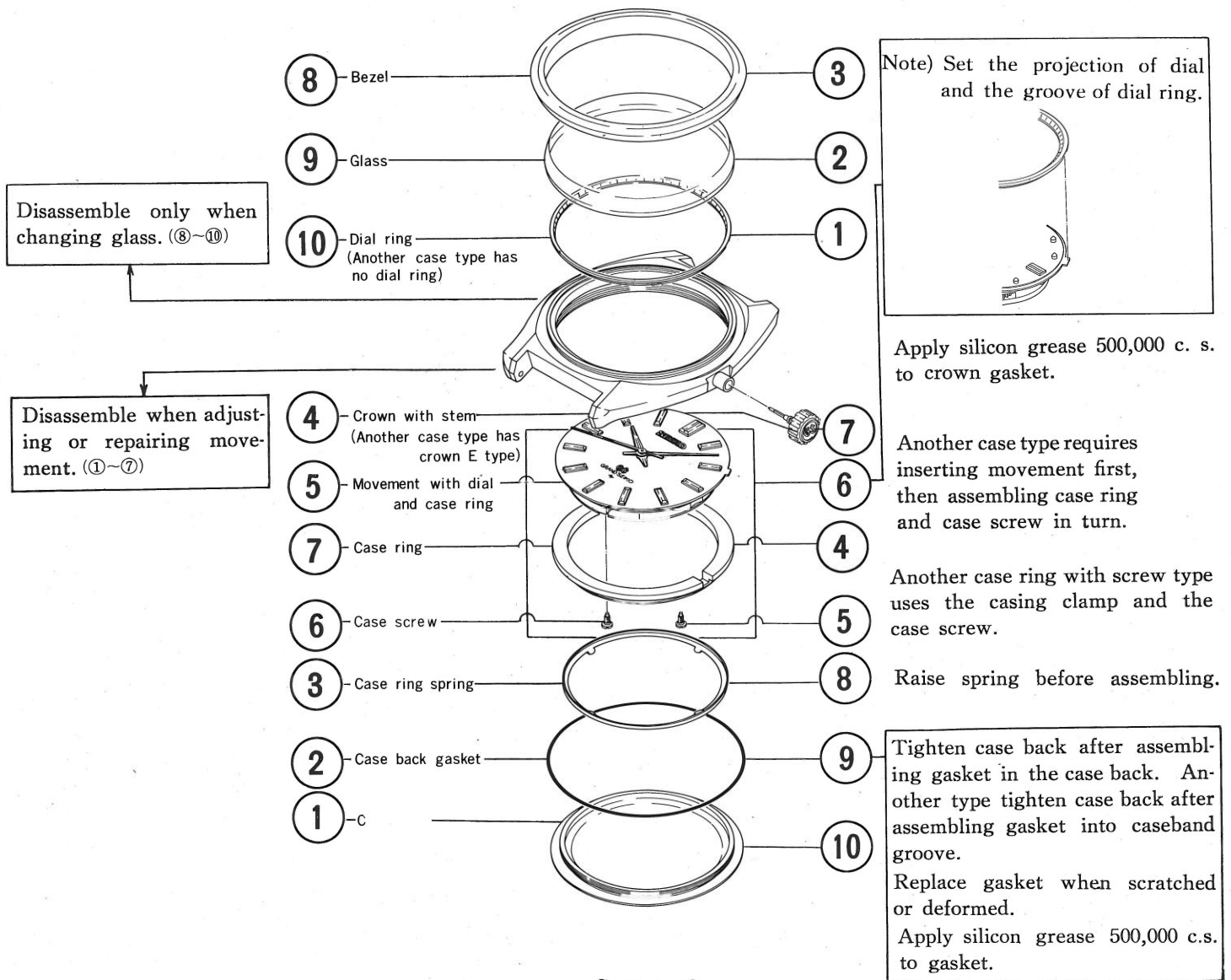
Glass : Hooped type
 Case back : Screw type
 Crown : W type



2 . Disassembling and assembling

Disassembling procedures

Assembling procedures

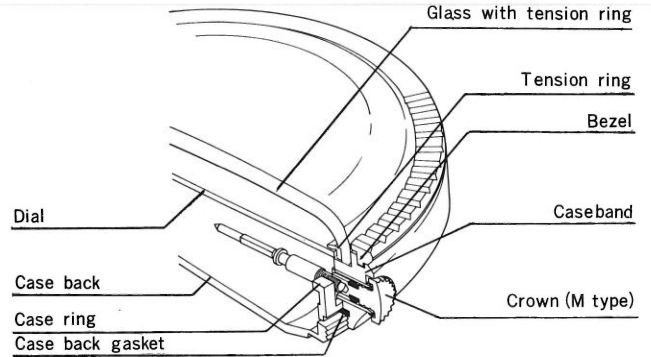


1 . Construction

Glass : Tension ring type

Case back : Screw type

Crown : M type



2 . Disassembling and assembling

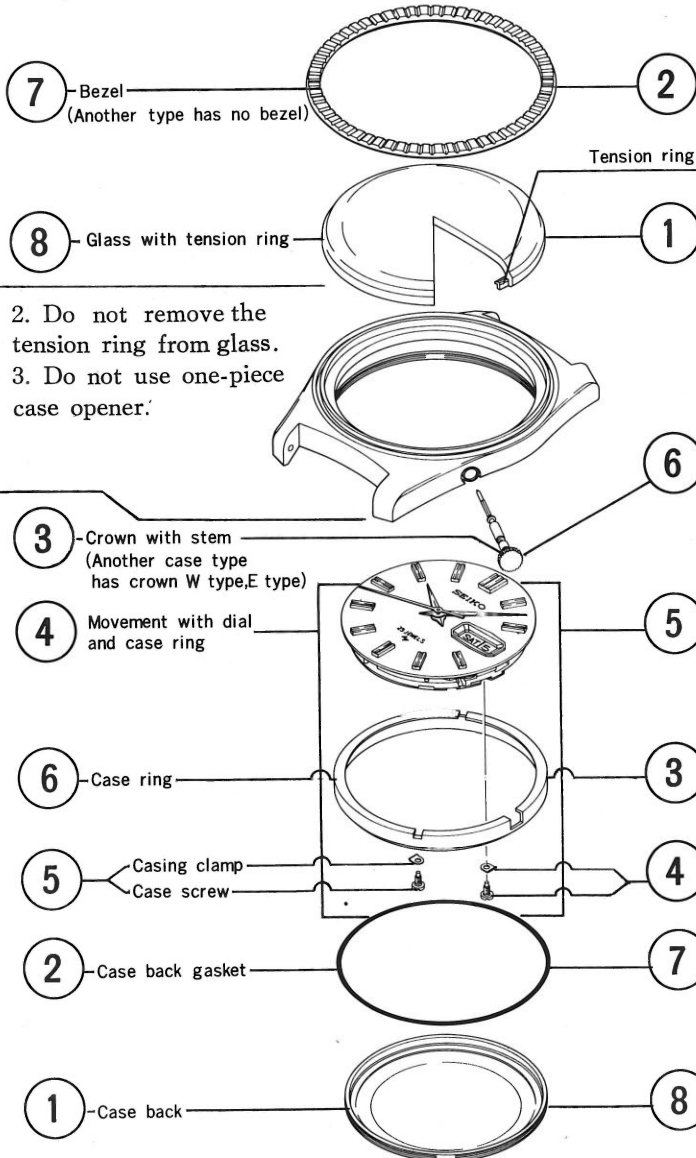
Disassembling procedures

Assembling procedures

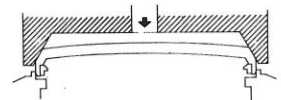
Disassemble only when changing glass (7~8)

Note) 1. Remove the glass by pushing outward from the inner side, using the waterproof case tightening tool.

Disassemble when adjusting or repairing movement. (1~6)



Use SEIKO waterproof case tightening tool.



Do not use one-piece case opener.

Note) Apply silicon grease 500,000 c.s. to crown gasket.

Note) Some case type require assembling the movement with dial, case ring, casing clamp, and case screw in order.

There is a case ring with spring.

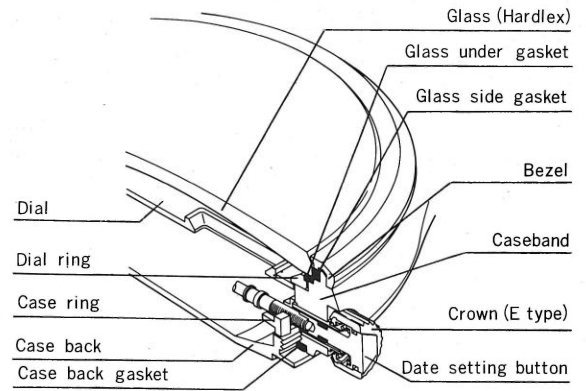


Some case has no casing clamp and case screw.

Assemble after inserting gasket into case back groove. Another type assemble after inserting gasket into caseband groove.

1 . Construction

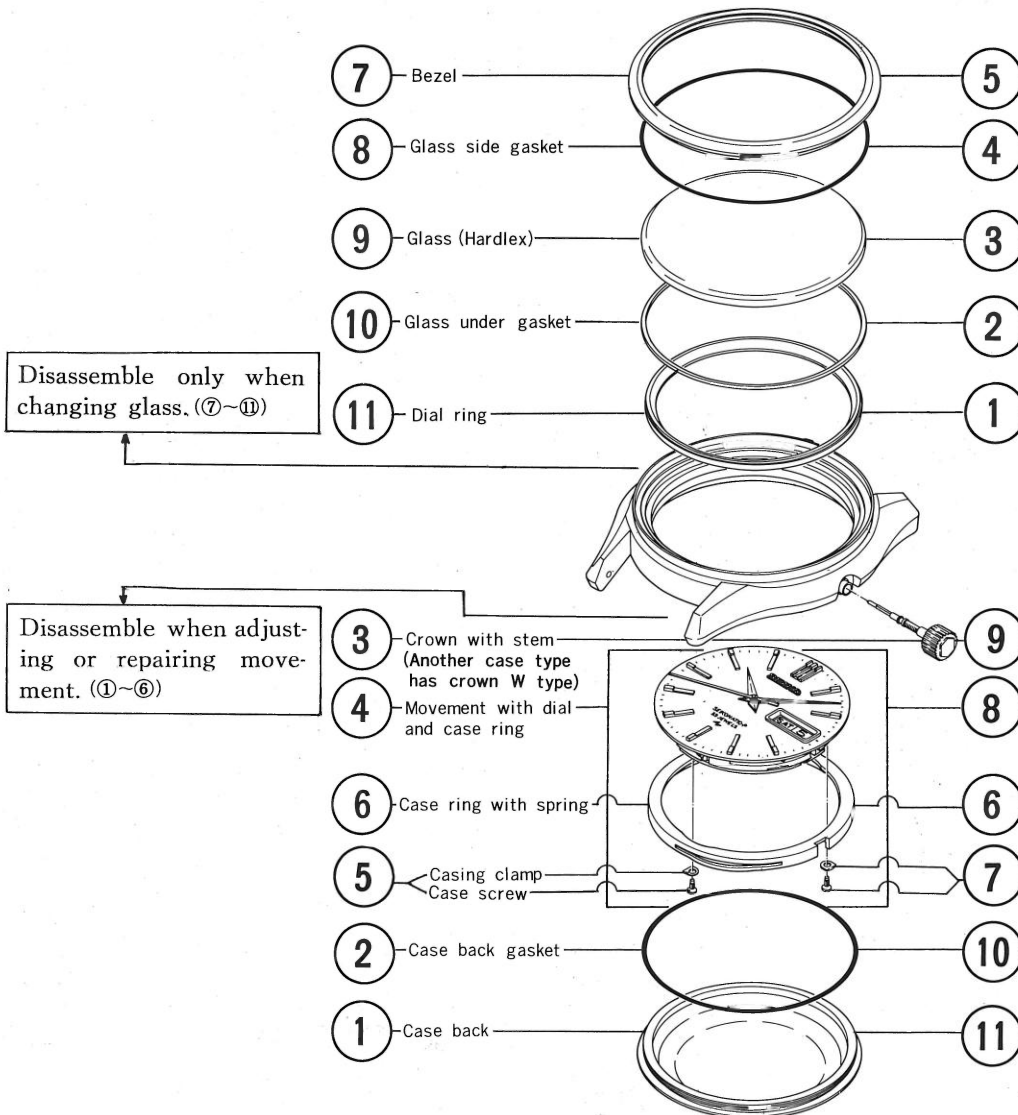
Glass : Hardlex
 Case back : Screw type
 Crown : E type (with date setting button)



2 . Disassembling and assembling

Disassembling procedures

Assembling procedures



Disassemble only when changing glass. (⑦~⑪)

Disassemble when adjusting or repairing movement. (①~⑥)

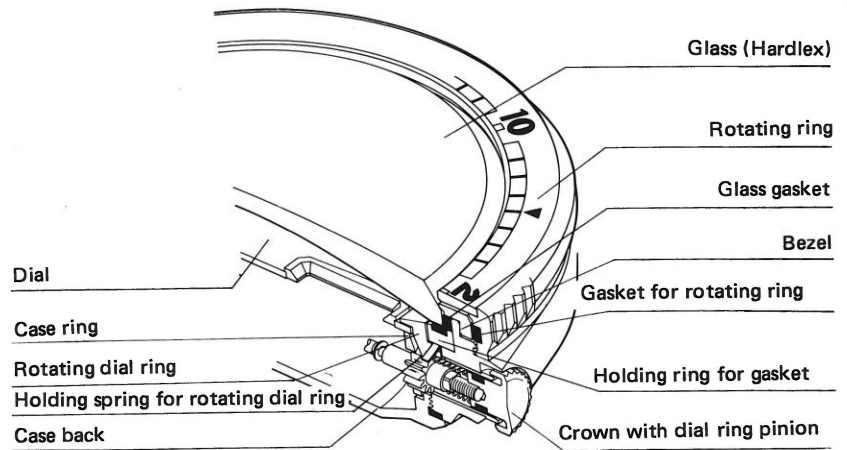
After putting bezel on the circumference of glass, press it in with a case tightening tool.
 After checking for gaps between bezel and caseband, if a gap exists, remove bezel and replace gasket; then press bezel on again.

Apply silicon grease 500,000 c.s. to crown gasket.

Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of case back when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

1. Construction

Glass: Hardlex
 Case back: Screw type
 Crown: W type
 (Additional mechanism): Rotating ring



2. Disassembling and Assembling

Disassembling procedures

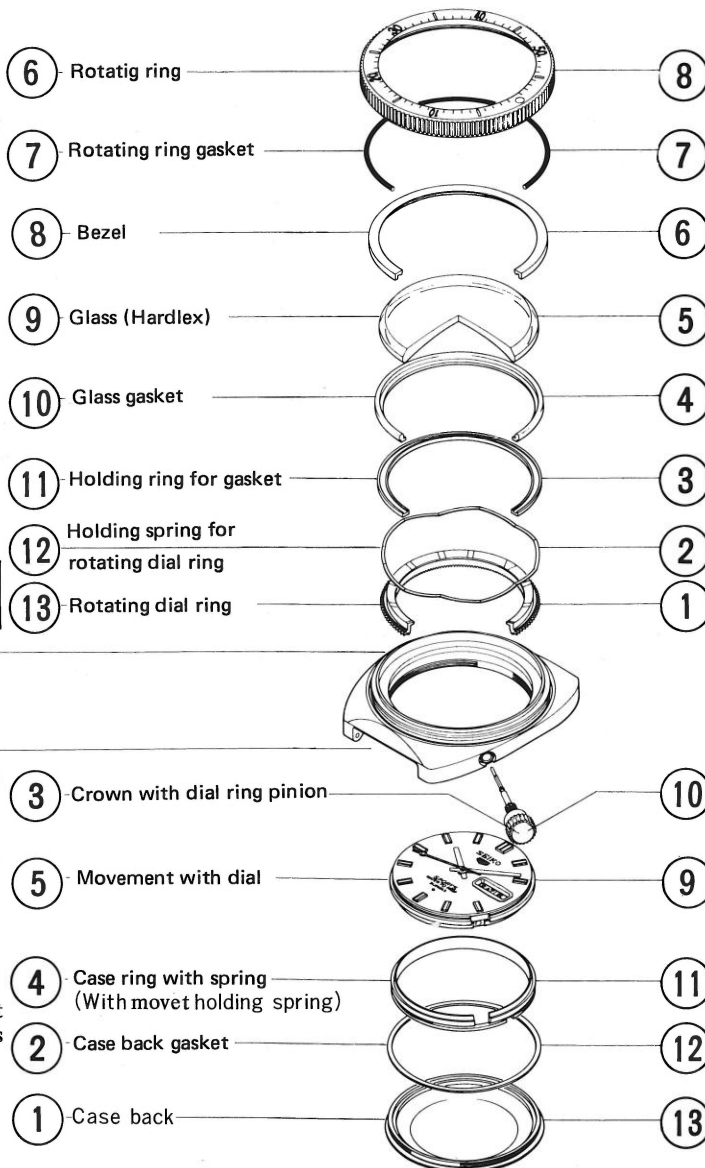
Assembling procedures

Some cases use a rotating ring spring.

Disassemble only when changing parts. (6-13)

Disassemble when adjusting or repairing movement. (1-5)

Do not detach movement holding spring. Some cases use a case ring with spring.



(Inserting method of rotating ring)
 There are two types of cases: one uses a gasket for rotating ring and another a rotating ring spring.
 * For cases using a rotating ring gasket
 1) Insert gasket for rotating ring into inner groove of rotating ring.
 2) Press in rotating ring by finger tip. If found to be too tight, use the tightening tool.
 * For cases using a rotating ring spring, refer to notes in Screw - 4.

Apply a small amount of silicon grease over entire circumference of the side of the glass and completely attach the glass to gasket. If grease is excessive, it will exude to stain the glass.

Note) Replace the gasket which is scratched or bent inward.

Note) 1. Apply silicon grease 500,000 c.s. to crown gasket.
 2. Insert the crown while interlocking dial ring pinion with rotating dial ring.

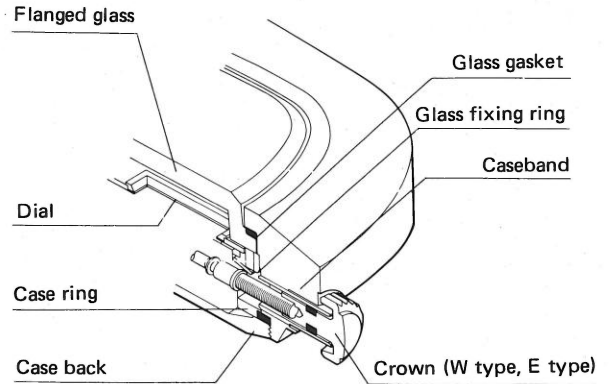
Assemble after inserting gasket into case back groove. Another type: assemble after inserting gasket into caseband groove. Replace when damaged or crushed. Apply silicon grease, 500,000 c.s. to gasket.

1. Construction

Glass: Flanged glass
 Case back: Screw type
 Crown: W type, E type

Features

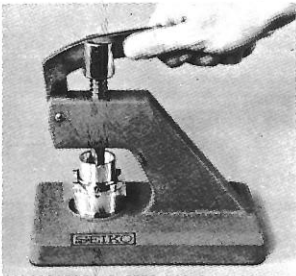
- * This construction maintains a water resistant condition by pressing the glass and glass gasket to the caseband through action of the glass fixing ring.
- * Water resistant condition is maintained by action of the glass fixing spring which presses the glass and glass gasket to the caseband, tightening the caseback through the case ring.



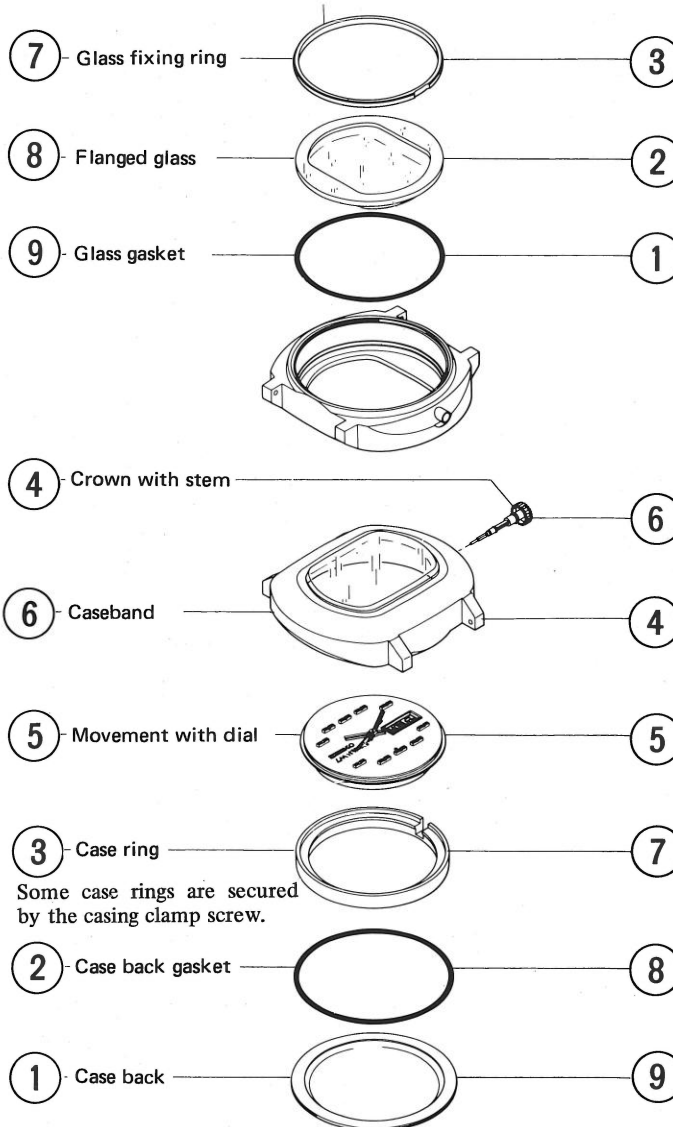
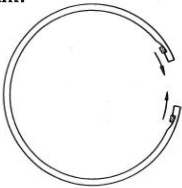
2. Disassembling and Assembling

Disassembling procedures

- * For glass fixing ring type
 Using the water resistant case tightening tool, remove the glass by pressing it as shown in the photo.



- * For glass fixing spring type:
 Remove the glass by narrowing the glass fixing spring with a pair of tweezers as shown in the diagram.



Assembling procedures

- * For glass fixing ring type:
 - 1) After assembling the caseband and glass gasket, set the glass on it. (Do not apply silicon grease to the gasket.)
 - 2) Set the glass fixing ring on the caseband after positioning a notch on the ring to the position of winding stem tube, then completely press it in by using the water resistant case tightening tool. (Refer to photo)
 Note) Select a slightly larger Disk than the glass and always spread a vinyl film over it to prevent scratches. Select a Inserting Disk (for glass with tension ring) suitable for the glass fixing ring, then press the glass in, being careful not to damage the winding stem tube.

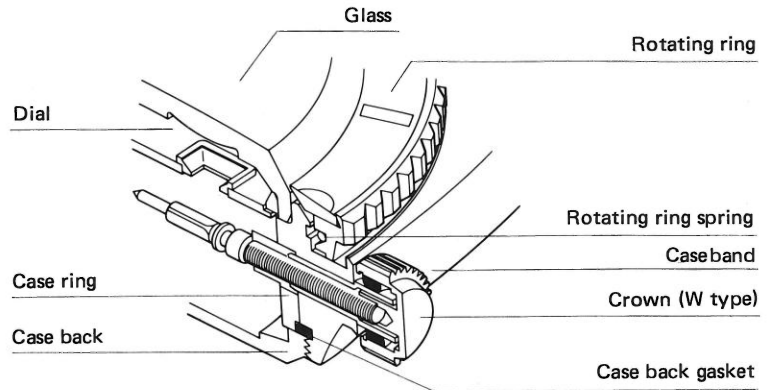


- * For glass fixing spring type
 - 1) Assemble the glass gasket inside the caseband, and set the glass on it.
 - 2) Set the glass fixing spring in the groove of caseband after narrowing the spring by using a pair of tweezers.

Set the movement holding spring on the movement before installing the dial and holding ring for dial.

1. Construction

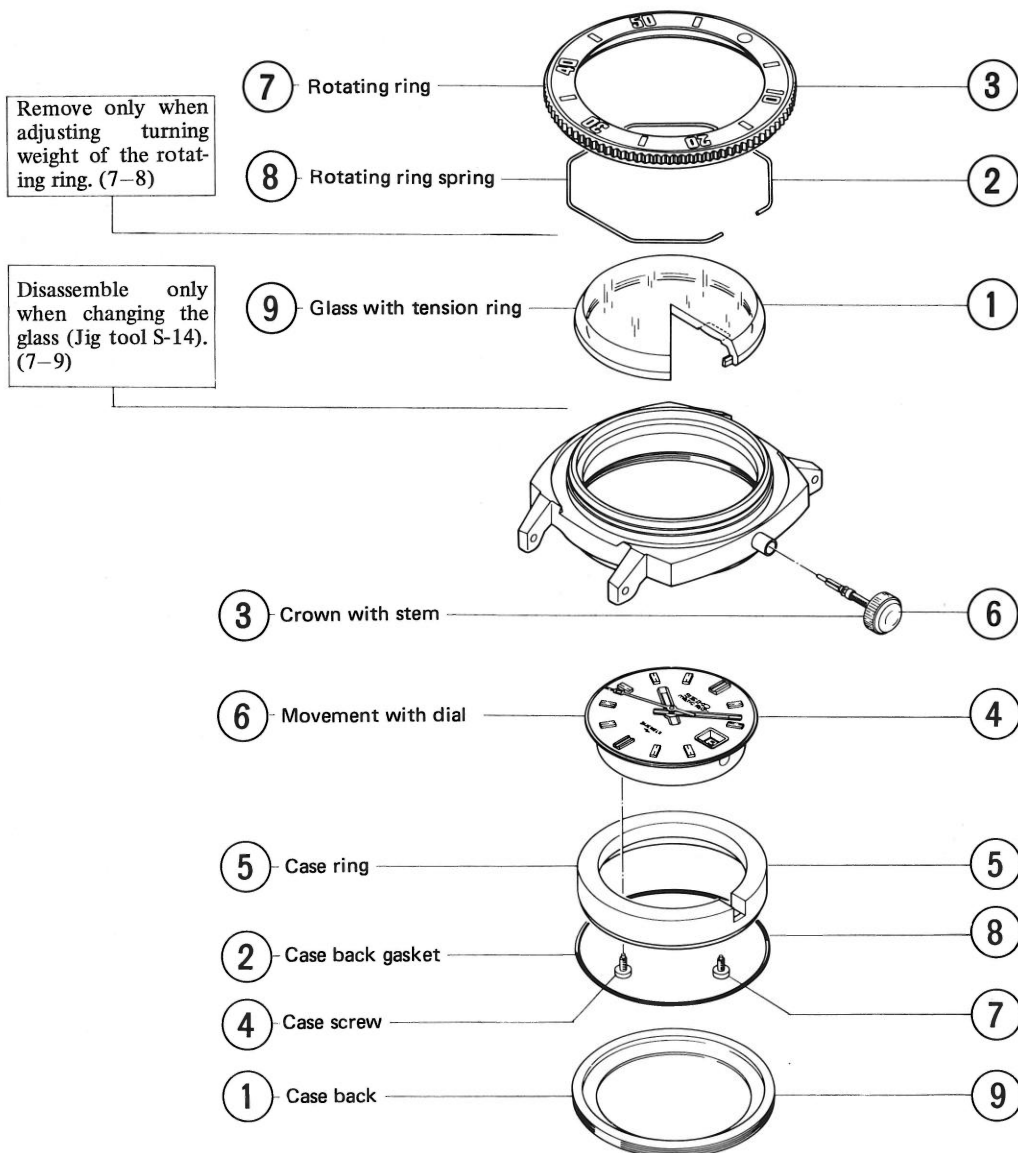
Glass: Tension ring type
 Case back: Screw type
 Crown: W type



2. Disassembling and Assembling

Disassembling procedures

Assembling procedures



Remove only when adjusting turning weight of the rotating ring. (7-8)

Disassemble only when changing the glass (Jig tool S-14). (7-9)

After inserting the rotating ring spring into the groove, press the rotating ring in the caseband while slightly turning it.

If the rotating ring is loose, enlarge the opening of rotating ring spring; when too tight, do otherwise.

When inserting glass, press it in by using the Inserting Disk (for glass with tension ring)

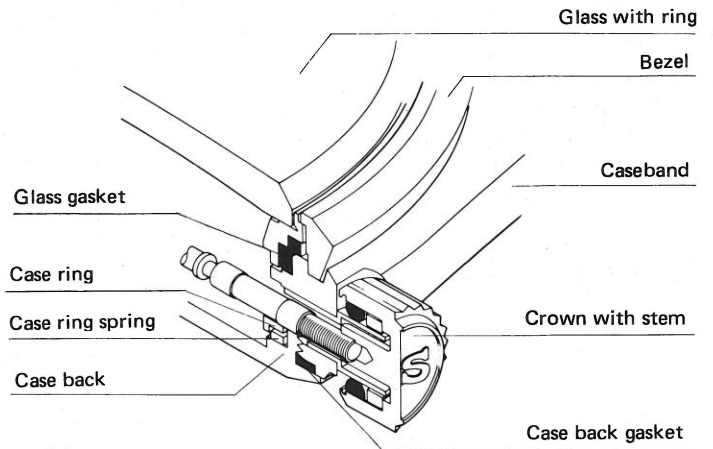
Apply silicon grease 500,000 c.s. to crown gasket.

Before assembling the caseback gasket, apply a small amount of silicon grease 500,000 c.s.

Screw-12

1. Construction

Glass: Hardlex (glass with ring)
 Case back: Screw type
 Crown: W type

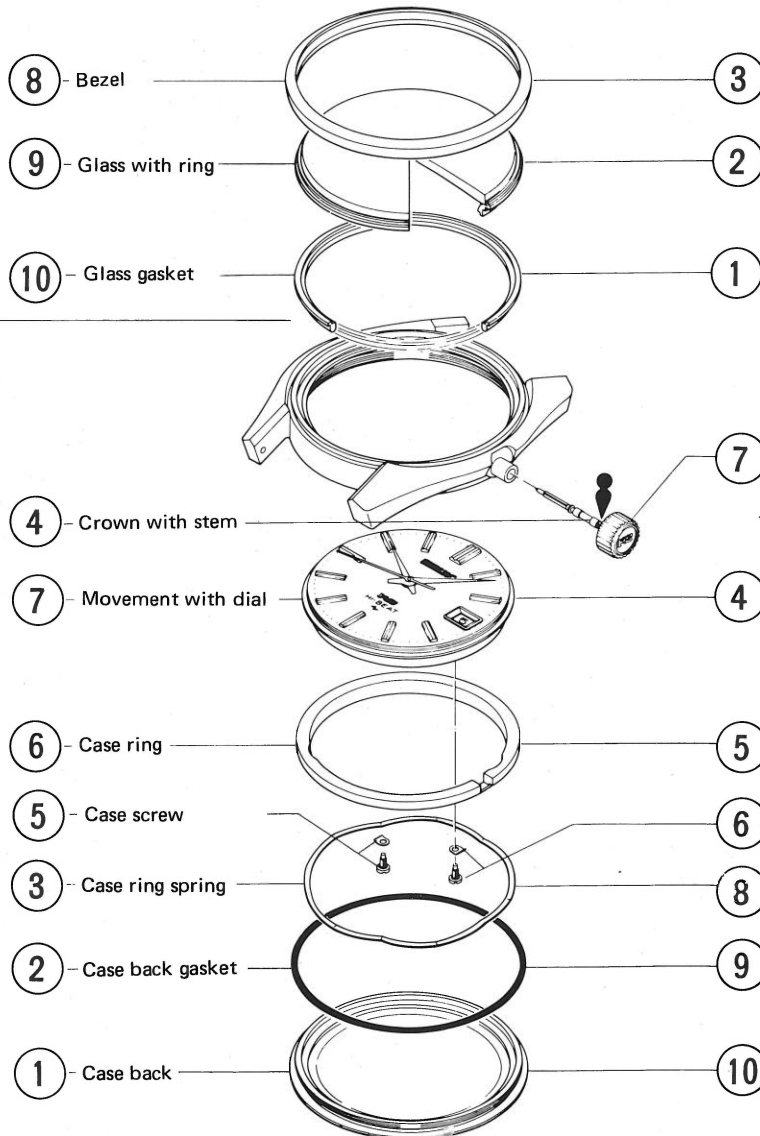


2. Disassembling and Reassembling

Disassembling procedures

Reassembling procedures

Disassemble only when changing glass. ⑧~⑩



Apply silicon grease 500,000 c.s. to crown gasket.

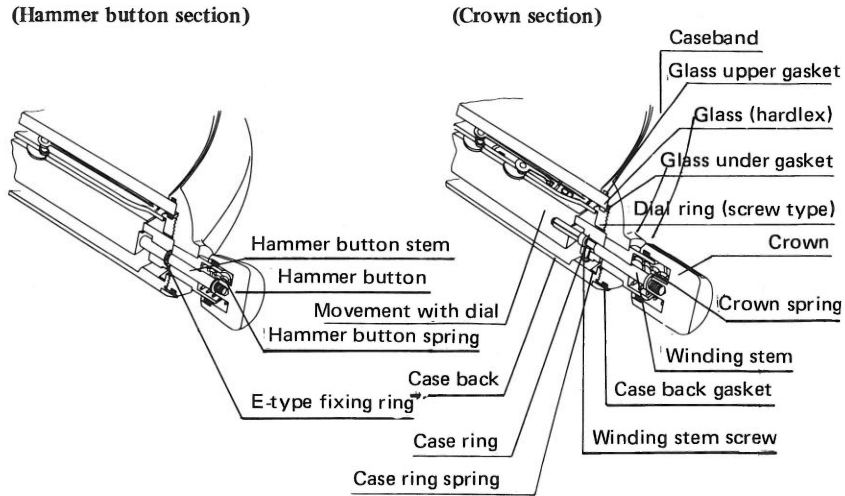
Apply a thin coat of silicon grease 500,000 c.s.

1. Construction (Stopwatch)

Glass: Hardlex (glass tightening type)
 Case back: Screw type
 Crown: R type

Features:

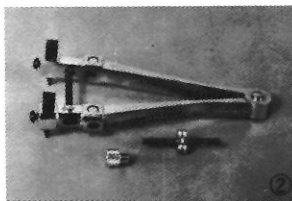
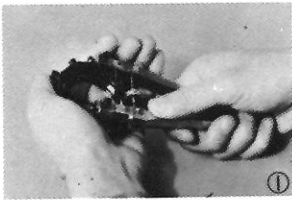
Splash-resistant construction; the dial ring of the case presses the glass and glass gasket to the caseband to keep splash-resistant.



2. Disassembling and assembling

(Disassembling and assembling the glass)

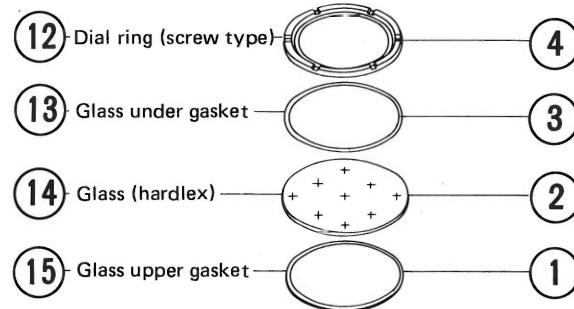
Use the case opener to remove the dial ring (screw type), turning the ring as shown in Photo 1. Since the dial ring diameter is large, use the case opener in a free condition by removing the adjusting screw of the case opener. (Photo 2).



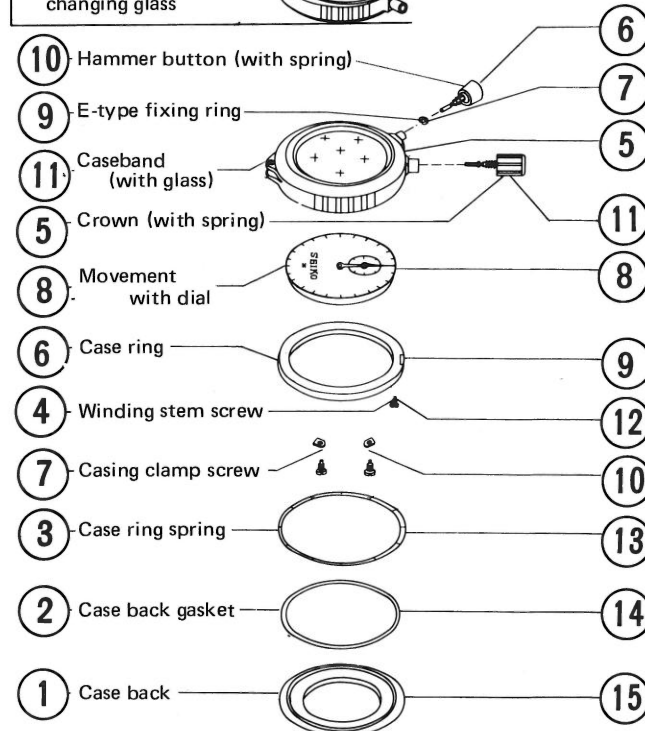
(Disassembling the hammer button)

First remove the E-type fixing ring set on the hammer button stem by a pair of tweezers, and then remove the hammer button.

(Disassembling)



Disassemble ⑫ - ⑮ only when changing glass



(Assembling)

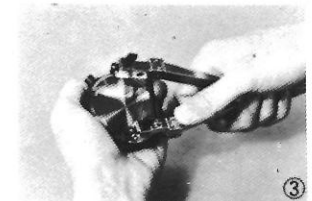
- o After temporarily tightening the dial ring with the fingers, securely retighten it with the case opener.
- o Do not apply silicon grease to the glass under gasket.
- o Apply a small amount of silicon grease to the glass upper gasket.
- o Always confirm that the gaskets are not twisted.

(Assembling the hammer button)

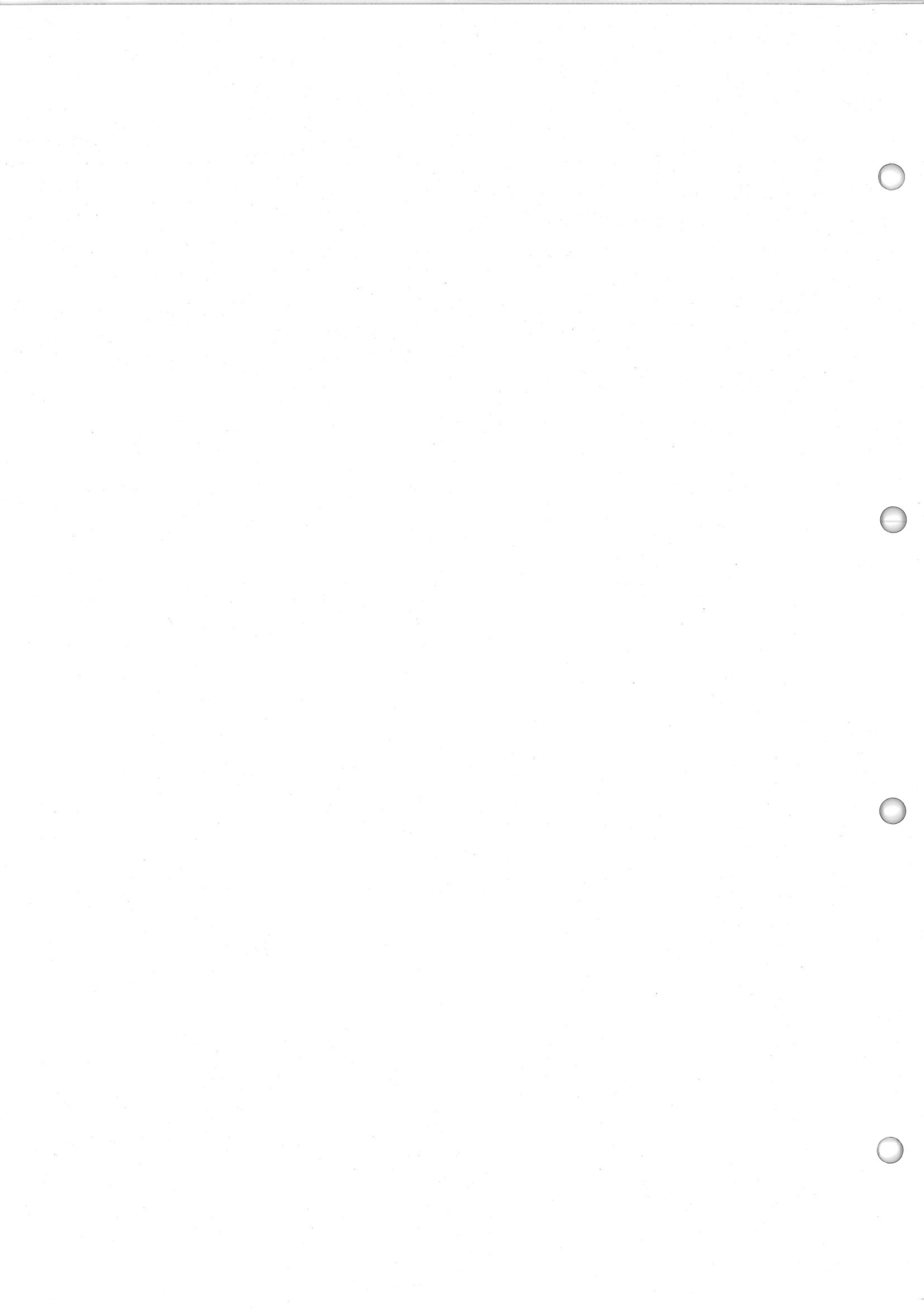
After installing the hammer button on the case, set the E-type fixing ring in a groove of the hammer button stem by using a pair of tweezers.

(Opening and closing methods of the case back)

Open or close the case back with the case opener securing the case by hand as shown in photo-3.



Note: When securing the case by hand, pay attention not to press the crown and the hammer button section.



1. Construction (G-structure)

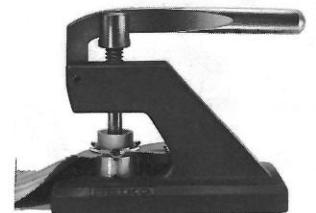
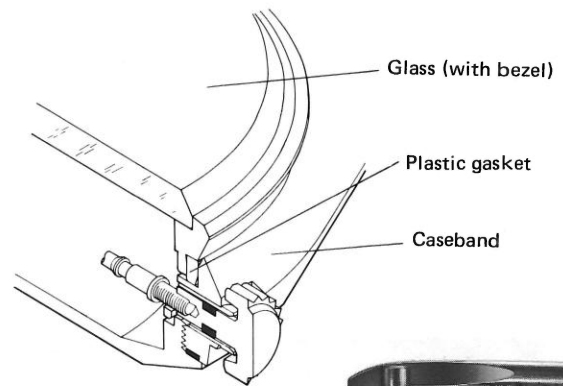
Glass: Hardlex (Its glass portion has unique features; various conventional combinations are provided on the case back and crown portions)

Features: The bezel is combined with the glass; however, some glasses are without bezels. The water-resistant, characteristic is maintained by having the plastic gasket pressed to the case with the glass or the bezel. Notch for opening the case is not provided.

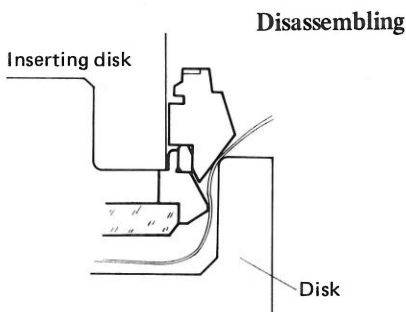
2. For disassembling and Assembling

Note: It is unnecessary to remove the glass with bezel and plastic gasket except when replacing them.

When detaching or attaching the glass (with bezel), use exclusive disks (S-160).



(How to remove the glass [with bezel])



Using the SEIKO water-resistant case tightening tool, remove the glass from the inner side by pushing the glass bezel without pressing on the actual glass (as shown in diagram).

Use a larger diameter disk than the bezel and always set the case. Spread a soft cloth to avoid scratches.

Should the plastic gasket adhere to the case, raise it slightly by using a thin wooden stick or toothpick with a beveled tip. Never scratch the case portion indicated by the oblique lines. Should case be scratched, water-resistant characteristic would be impaired.



Assembling

Plastic gasket

Assemble the glass combined with the gasket or after combining the plastic gasket with the glass to the case. Do not mistake the plastic gasket's upper with the lower side.

- Never re-use a plastic gasket which has been already used.
- Wash in alcohol for a while.

To assemble the glass (with bezel): Push the glass in as shown in diagram, using the SEIKO water-resistant case tightening tool.

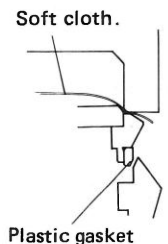
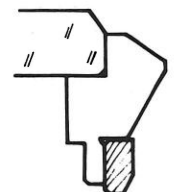
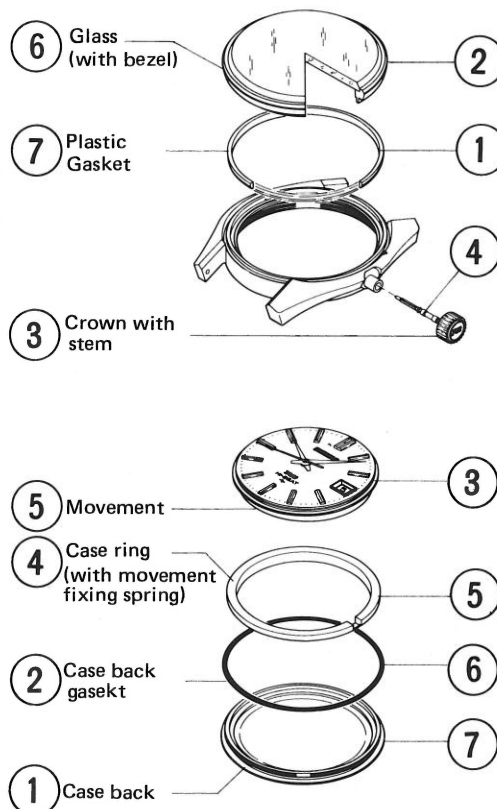
Select a slightly larger inserting disk than the glass and press on the glass bezel. Never press on the actual glass.

Use soft cloth to prevent scratching the glass.

When the glass is elliptical in shape

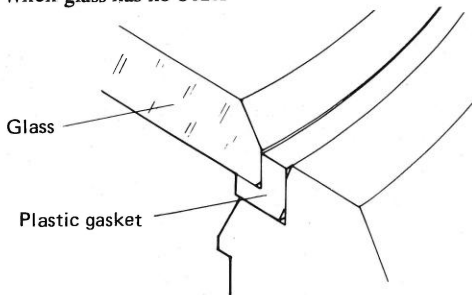
Select a slightly larger inserting disk than the longer elliptical diameter of the glass, then press in the glass bezel.

When the case back gasket is soiled, wash the gasket. Replace the scratched and/or deformed gasket and apply a 500-thousand unit of silicon grease.

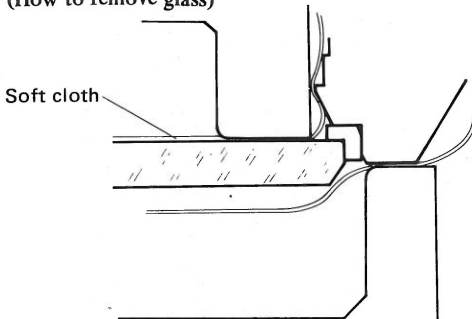


Screw-14

When glass has no bezel



(How to remove glass)



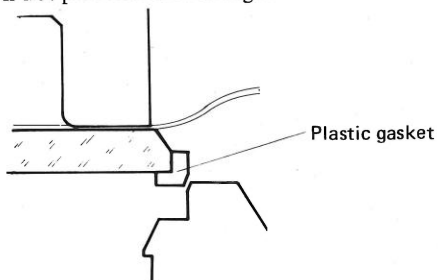
Push out the glass by using SEIKO water-resistant case tightening tool after spreading cloth on the disk.

Select a slightly larger removing disk than the glass.

Select a slightly larger disk than the plastic gasket for receiving and lay the flat surface of the case on the cloth.

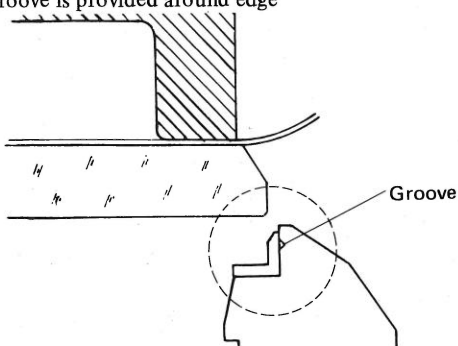
(How to fix glass)

1) When groove is not provided around edge.



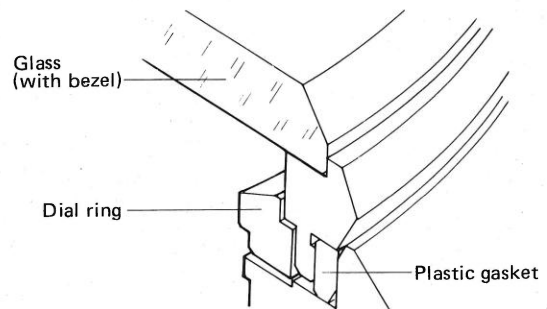
After fixing the plastic gasket on the glass, push the flat surface of the glass with the flat surface of the inserting disk, spreading soft cloth between them. Select a slightly larger inserting disk than the outer diameter of the glass.

2) When groove is provided around edge

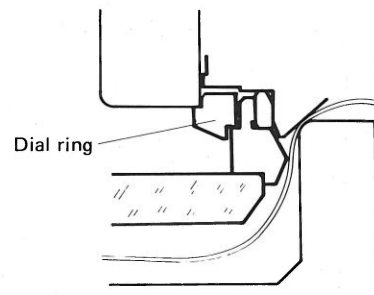


When groove is provided around inserting edge of the case (as shown in diagram), press in the glass after inserting gasket in the case.

When dial ring is provided

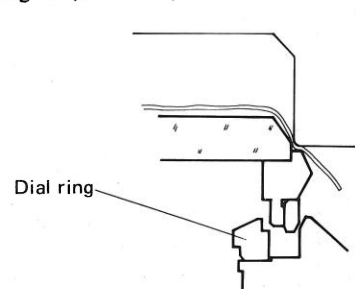


(How to remove glass [with bezel])



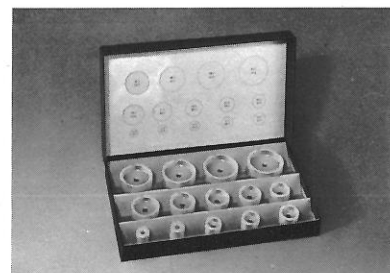
Push out the glass by pressing the dial ring with the removing disk. Selecting a slightly larger disk than the glass bezel, receive the case on soft cloth.

How to fix glass (with bezel)



First, set the dial ring on the case as shown in diagram, then press in the glass.

* Use SEIKO exclusive disks (S-160) when attaching or detaching the glass (with bezel)



Screw-15

1. Construction

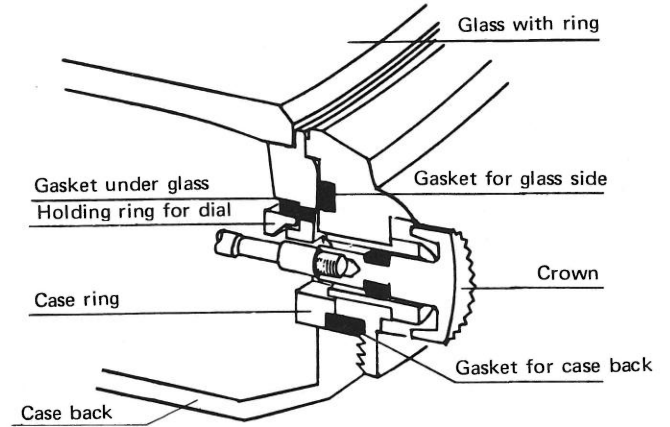
1-1 Construction of Glass Portion

The glass with ring which is matched with the caseband is pushed up to the caseband by the case ring.

2. Lubrication

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points:

Types of Oil	Oil Quantity
● Silicon grease 500,000 c.s.	○◊ Liberal quantity
	○◊ Normal quantity
	⊗ No lubrication



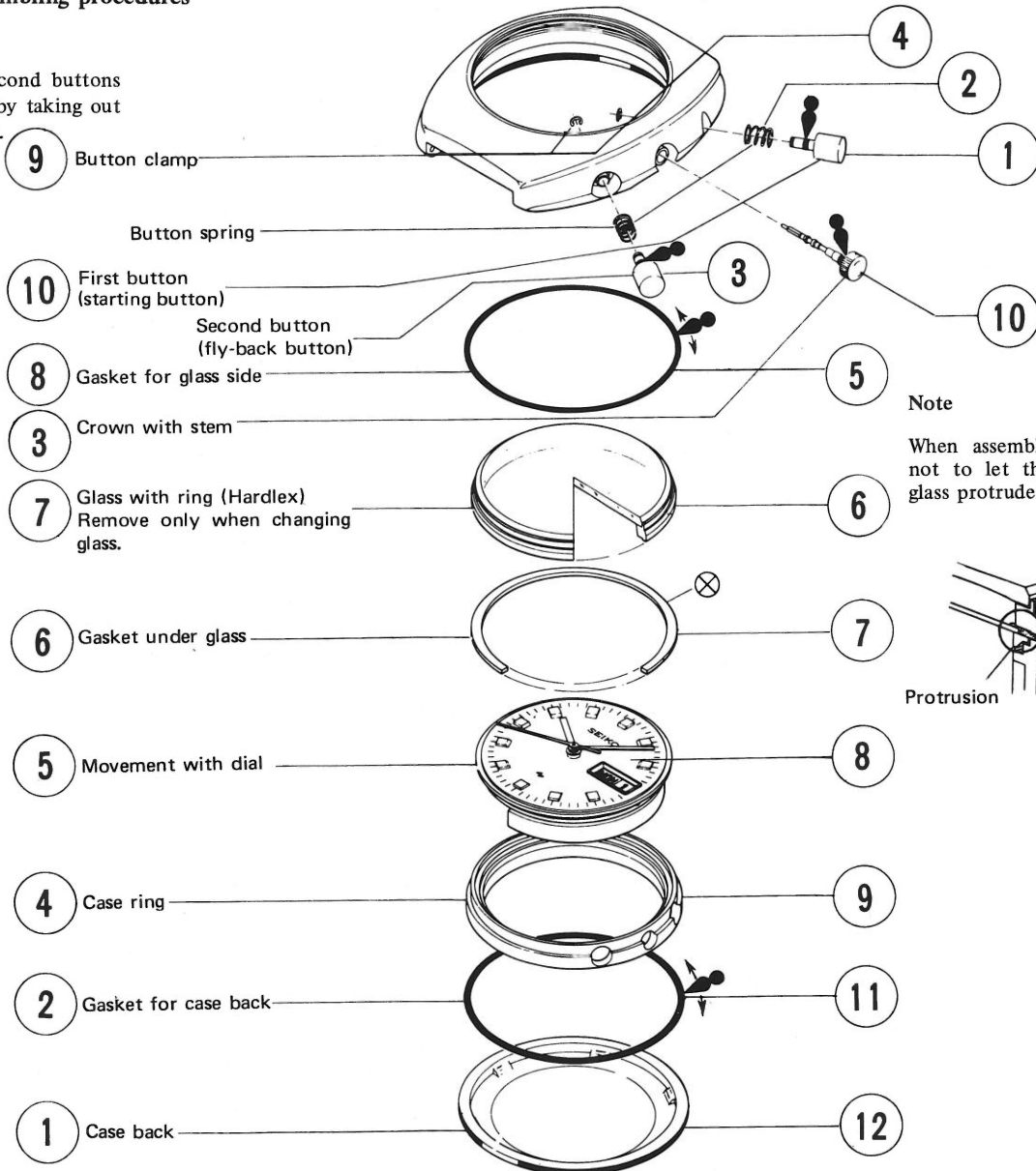
3. Disassembling and Assembling

Disassembling procedures

Assembling procedures

Note

The first and second buttons can be removed by taking out the button clamp.



Screw-16




1. Construction

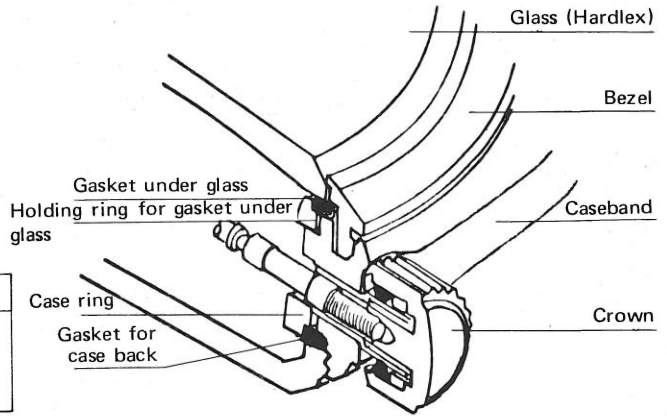
1-1 Construction of Glass Portion

The glass and gasket under glass are fixed to the caseband along side of the bezel.

2. Lubrication

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points:

Types of Oil	Oil Quantity
▶ Silicon grease 500,000 c.s.	 Liberal quantity  Normal quantity  No lubrication



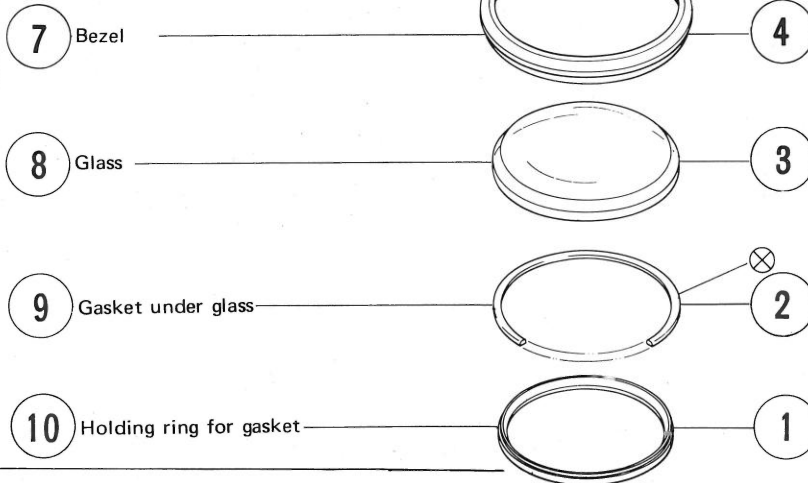
3. Disassembling and Assembling

Note

- How to remove the glass
Remove the glass from the bezel by pushing the case opener into the groove of the bezel.

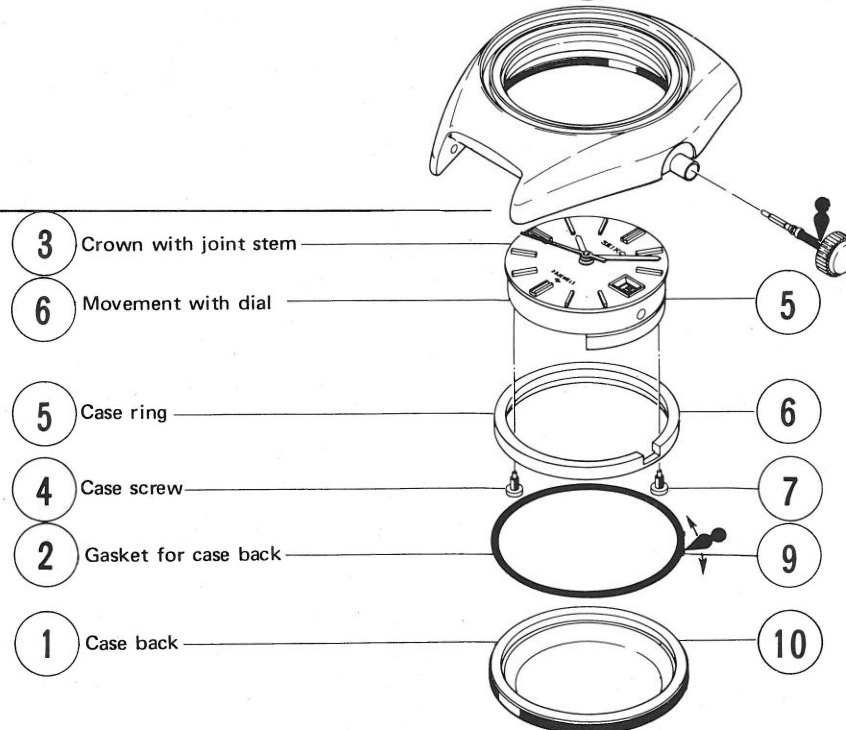
Remove only when replacing the glass.

Disassembling procedures



Assembling procedures

Remove the case-band when repairing the movement.



Screw-17




1. Construction

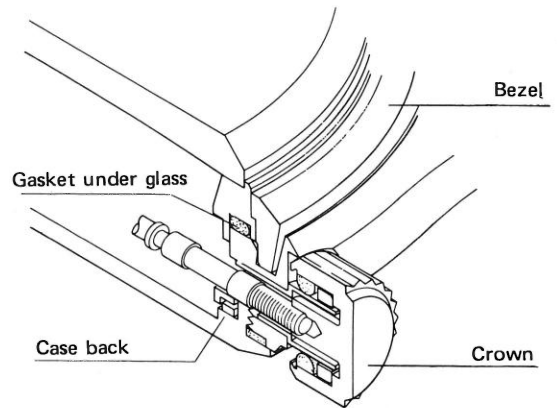
1-1 Construction of Glass Portion

The glass with ring pushes the gasket to the caseband along side of the bezel.

2. Lubrication

The following marks in the diagram indicate the types of oil and quantities to be applied and the lubricating points.

Types of Oil	Oil Quantity
 Silicon grease 500,000 c.s.	 Liberal quantity  Normal quantity



3. Disassembling and Assembling

Note

Remove the bezel by pushing the case opener into the opening notch and then the glass can be removed as follows.

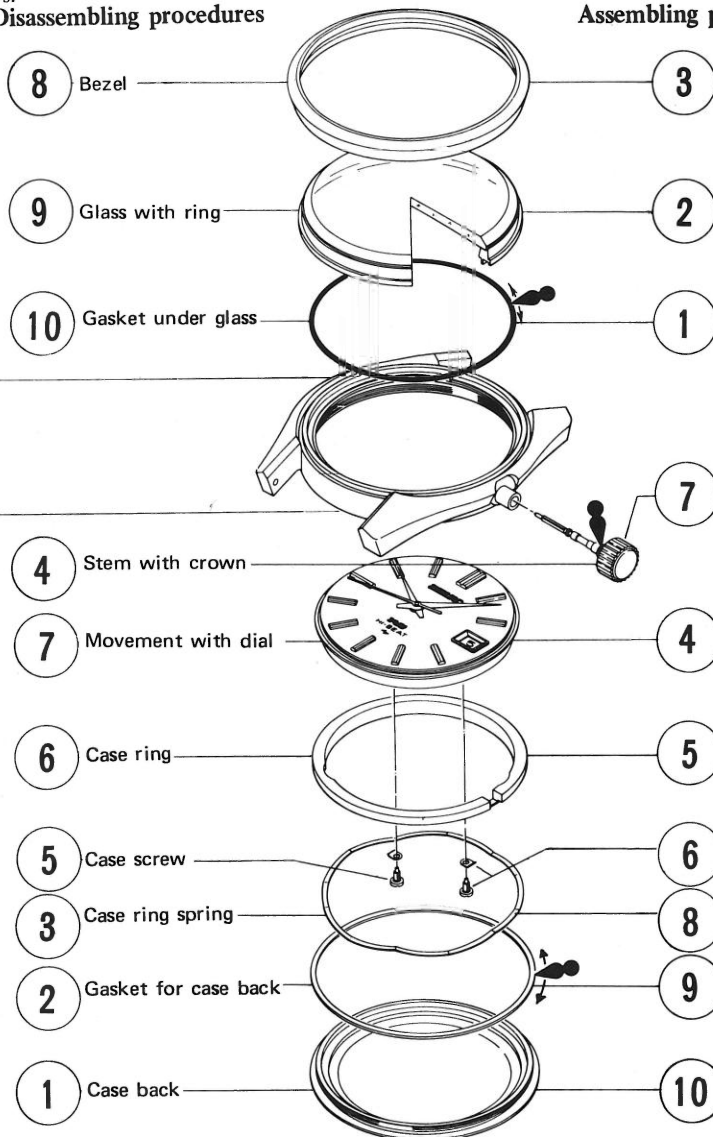


Remove only when replacing the glass.

Remove the case-band when repairing the movement.

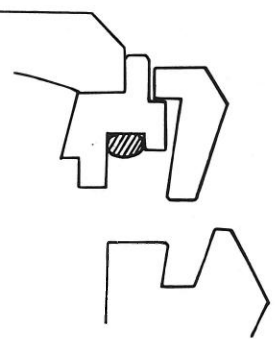
Disassembling procedures

Assembling procedures



Note

Push the gasket into the glass ring and fix the glass ring with gasket by the bezel using the inserting disk.

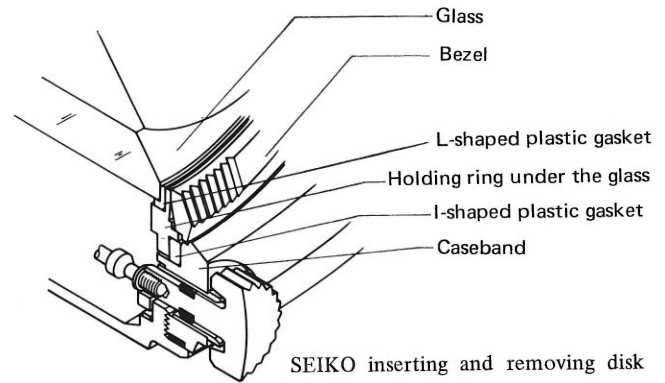




Screw-18

1. Construction of Glass Portion




The glass is held with the holding ring under the glass which has the L-shaped plastic gasket placed on its upper shelf (hollow) and the I-shaped plastic gasket placed between its lower side and the caseband. For this construction the glass and bezel should be pressed very firmly into the caseband so as to have a very tight fit with the gaskets.



SEIKO inserting and removing disk S-160
Use S-160 inserting and removing disk for this type of construction.

2. Lubricating

The following marks in the diagram indicate the type and quantities of oil to be applied and the lubricating portions.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity Never lubricate the portions marked 

3. Disassembling and reassembling

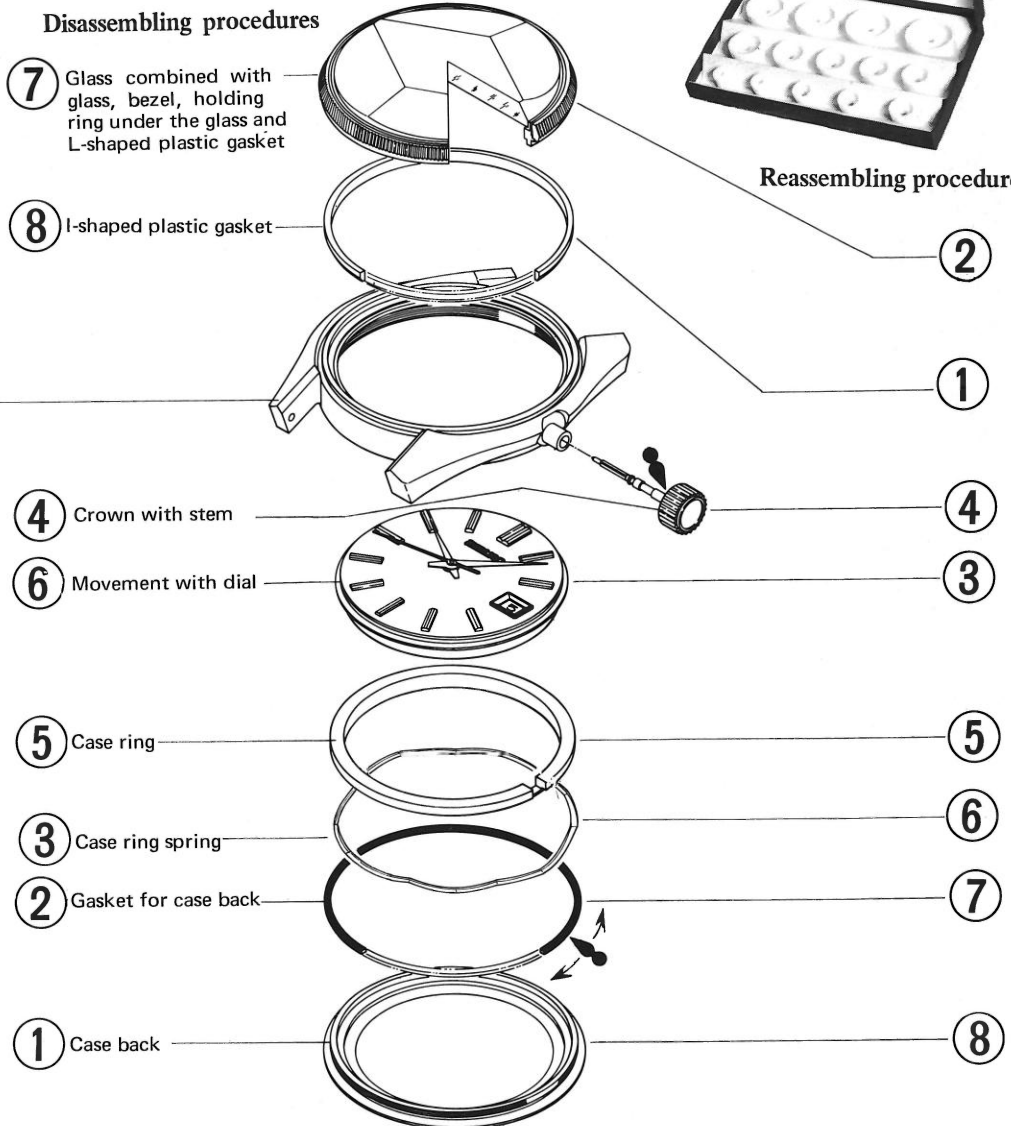
Note:

How to remove the glass

Do not pry open the bezel, but remove the glass from inner side of the caseband together with the bezel.

See next page for details.

Disassemble only when glass is replaced with new one.



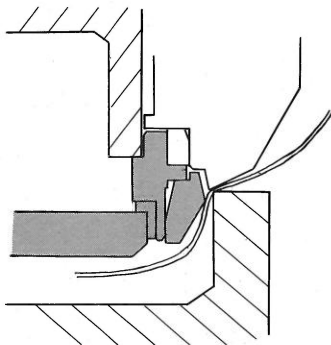
Screw-18

3-1 How to remove the glass portion

Do not remove the glass except when it is replaced with new one. Do not use an I-shaped plastic gasket once used, which must be replaced with new one.

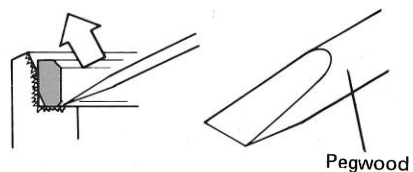
Remove the glass portion with SEIKO water-resistant case tightening tool (S-220) and inserting and removing disk (S-160) while pushing the holding ring under the glass from its inside.

Select the inserting and removing disk of larger diameter than that of the bezel, and a chamois sheet must be placed between the inserting and removing disk and the caseband.



SEIKO tightening tool (S-160)

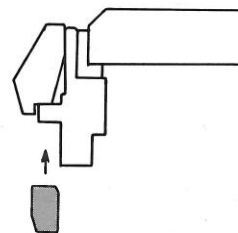
When an I-shaped plastic gasket is left on the caseband, remove it with a tip of a pegwood as shown in the illustration. Be careful not to scratch the shaded portion of the caseband, which may cause defective water-resistant.



Pegwood

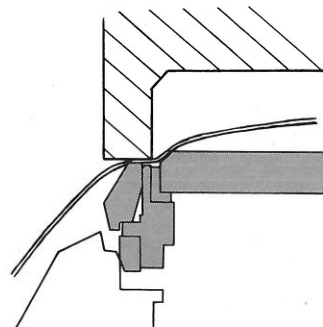
3-2 How to fix the glass portion

1. Fix an I-shaped plastic gasket into the glass (combined with glass, L-shaped plastic gasket, bezel and holding ring under the glass).



2. Use SEIKO water-resistant tightening tool (S-220) and select the inserting and removing disk (S-160) of a little larger diameter than that of the bezel and push in the bezel to fix the glass portion as shown in the illustration.

A chamois sheet must be placed between the inserting and removing disk and the bezel to prevent scratching.



Screw-19





1. Consturction of glass portion

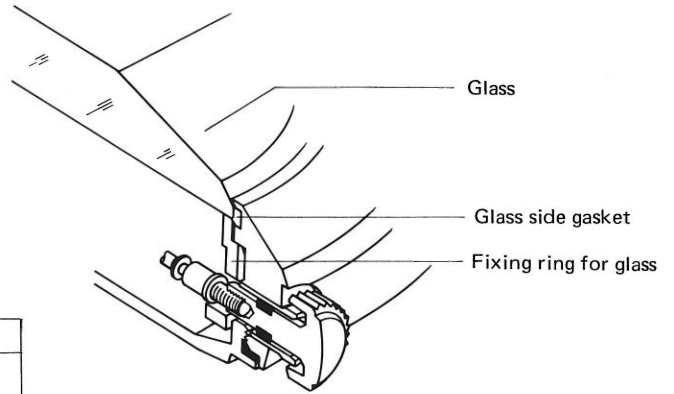
1-1 Construction of Glass Portion

The glass is fixed by the fixing ring for glass and by the caseband, having the glass side gasket in the upper inside groove of the caseband.

2. Lubricating

The following marks in the illustration indicate the type and quantities of oil to be applied and the lubricating portions.

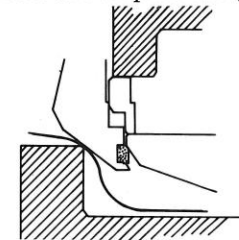
Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity  Small quantity Never lubricate the portions marked 



Note:

○ How to reassemble the glass

Be sure to check the glass side gasket is fixed into the groove of the caseband, and push the glass in together with the fixing ring for glass. Be careful not to push the glass only.



3. Disassembling and reassembling

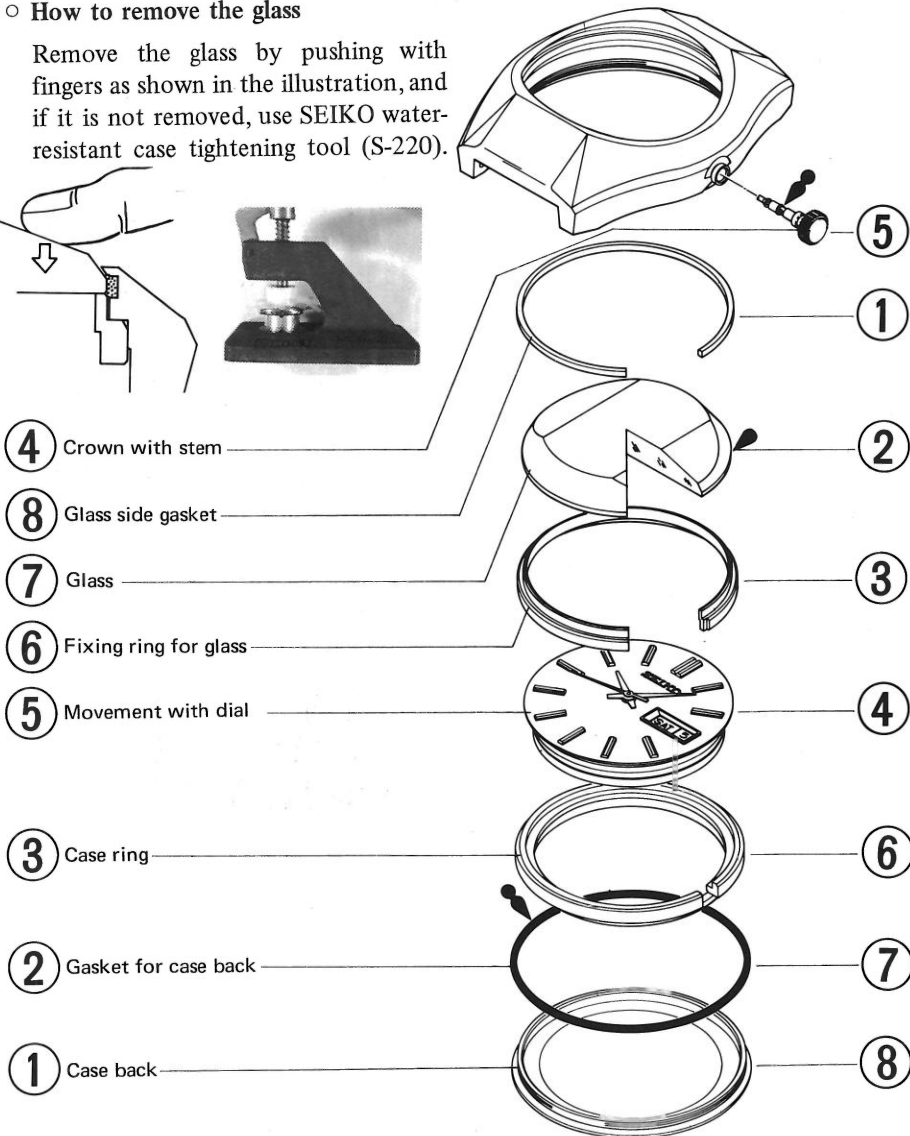
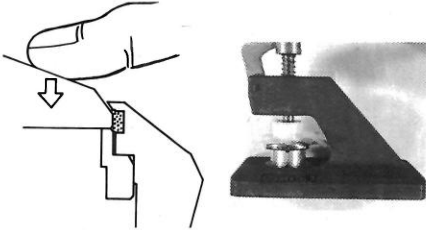
Note:

Disassembling procedures

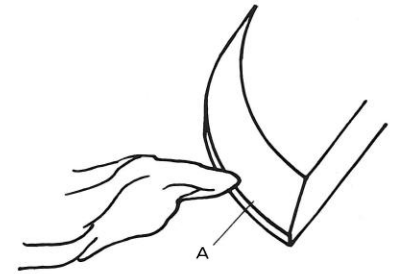
Reassembling procedures

○ How to remove the glass

Remove the glass by pushing with fingers as shown in the illustration, and if it is not removed, use SEIKO water-resistant case tightening tool (S-220).

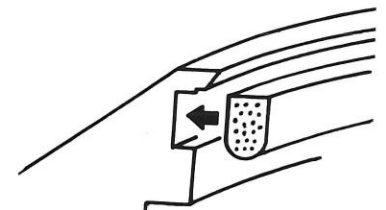


- Apply silicon grease (500,000 c.s.) extremely small quantity around the glass circumference (A), which facilitates to fix the glass into the bezel.



○ How to handle the glass side gasket

It is not necessary to remove the gasket under normal disassembling and reassembling conditions. Clean only the contacting portion with the glass. Replace the glass side gasket with a new one when it is removed and put it into the groove of the caseband as shown below.



Screw-20

1. Construction

1-1 Construction of Glass Portion





The gasket for glass is pushed to the bezel with the glass, and the plastic gasket is pushed to the caseband with the bezel.

1-2 Crown construction

As there are screw-threads in the inner surface of the crown and on the surface of the stem pipe and under normal use the crown must be screwed in. When pulling out the crown, unscrew the crown. The stem spring located inside the crown works to push the crown toward outside, and the gasket for crown is fixed with the holding ring for gasket.

2. Lubricating

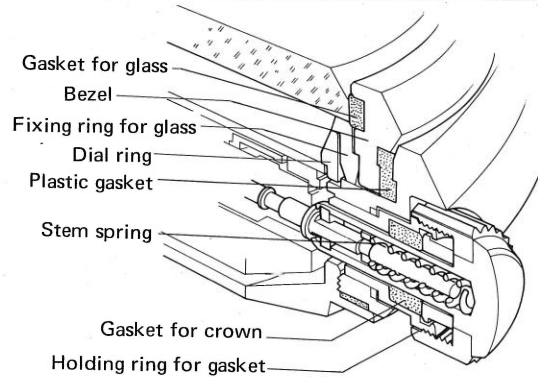
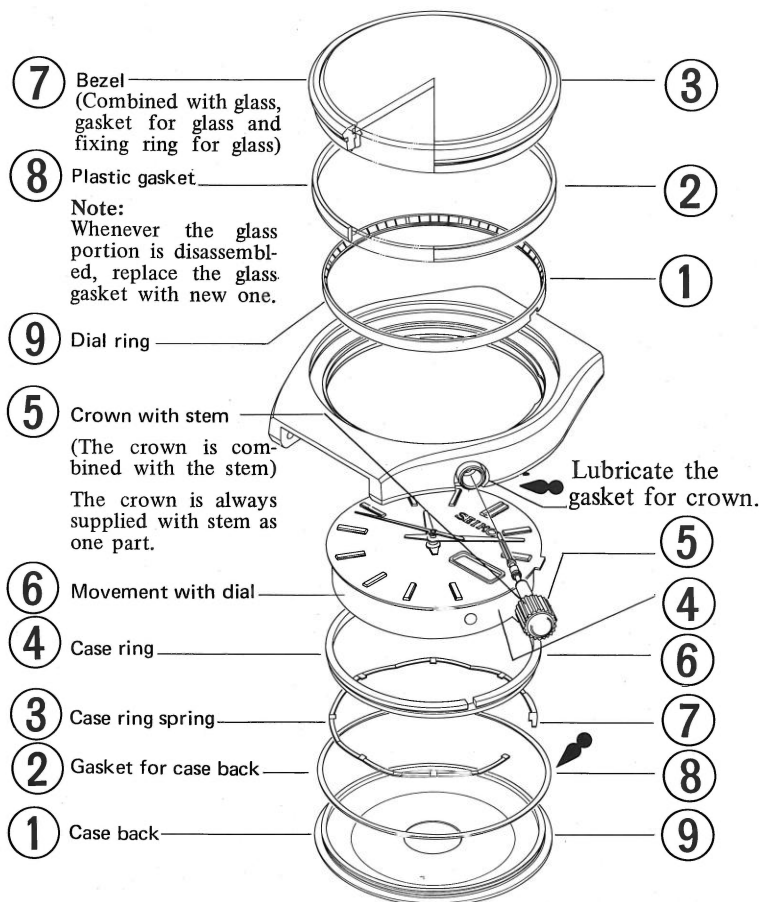
The following marks in the diagram indicate the type and quantities of oil to be applied and lubricating portions.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity  Small quantity Never lubricate the portions marked 

3. Disassembling and reassembling

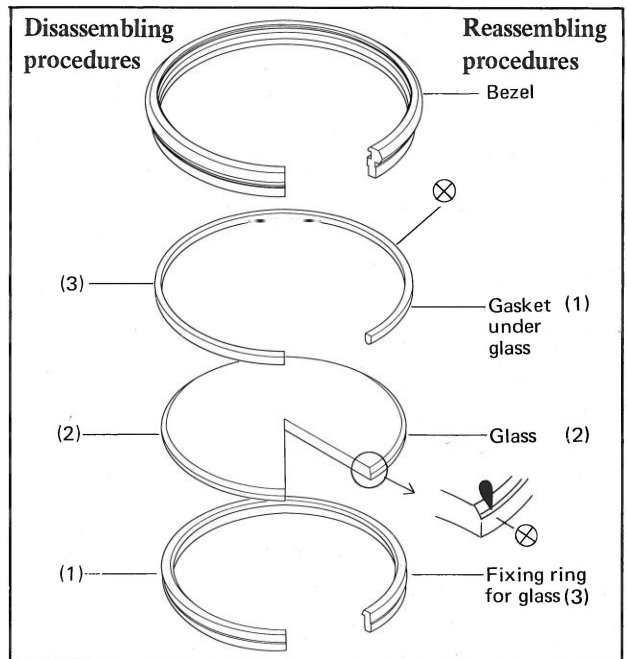
Disassembling procedures

Reassembling procedures



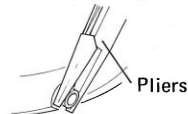
Disassembling and reassembling procedures of the glass portion.

As for disassembling and reassembling procedures of the glass portion refer to Snap-4.



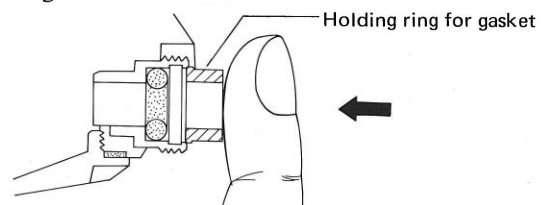
How to remove the holding ring for gasket

Remove the holding ring for gasket after crushing it with a pliers as shown in the illustration below. (Do not use the holding ring for gasket once used.) When replacing the gasket for crown, the holding ring for gasket must be also replaced with a new one.



How to reassemble the holding ring for gasket

Be sure to use a new holding ring for gasket. Push it in with fingers or a tweezer.



Note:

Be careful not to scratch the caseband and the holding ring for gasket.

Screw-21

1. Construction

1-1. Construction of Glass Portion





The glass and gasket for glass are pushed to fix to the caseband by the bezel.

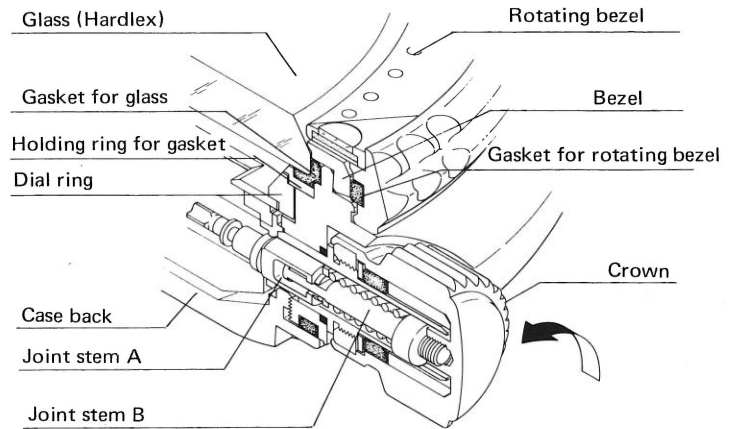
1-2. Crown construction

As there are screw-threads in the inner surface of the crown and on the surface of the stem pipe, under normal use the crown must be screwed in. When pulling out the crown, unscrew the crown in the arrow-marked direction. The stem consists of the two parts, and they can be replaced individually.

2. Lubricating

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity  Small quantity  No lubrication



3. Disassembling and reassembling

< Disassembling procedures >

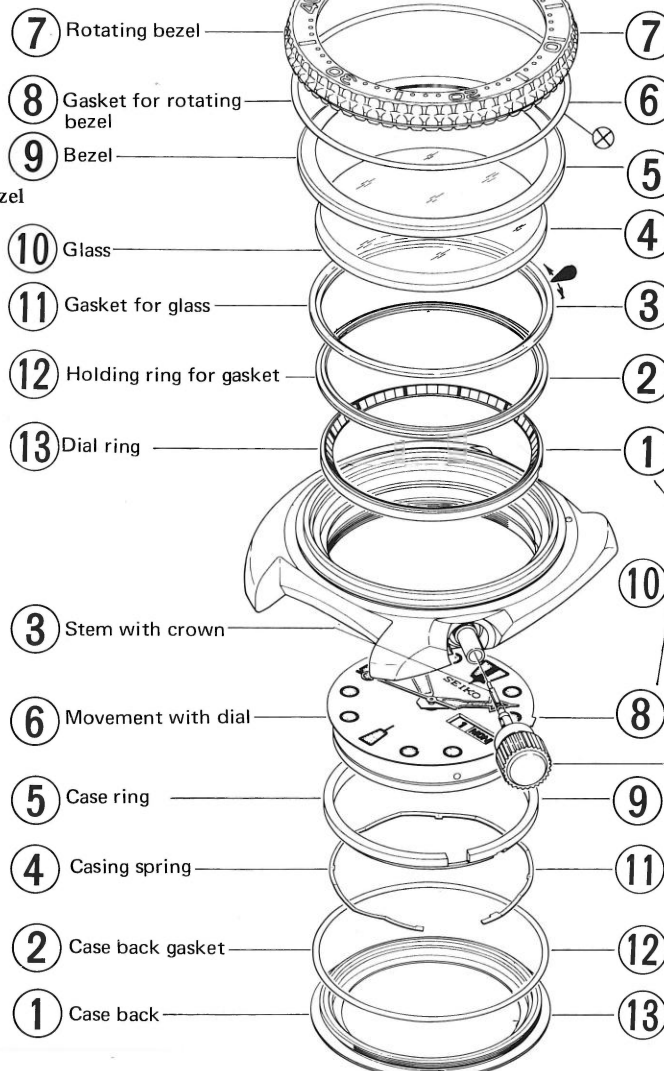
Remarks for disassembling

How to remove the rotating bezel

- Remove the rotating bezel by pushing the case opener into the opening notch.
- Be careful not to bend the rotating bezel when removing.

How to remove the glass

- Remove the bezel by pushing the case opener into the opening notch and then push the glass from inside for disassembling.
- Be careful not to scratch the inner surface of the glass when disassembling.



< Reassembling procedures >

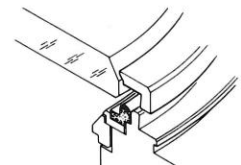
Remarks for reassembling

How to reassemble the rotating bezel

- After setting the gasket for rotating bezel into the rotating bezel, place the rotating bezel on the caseband and push it in position by the palm.

How to set the gasket for glass

- Be sure to apply only a small quantity of silicon grease to the gasket for glass so that it does not come out onto the holding ring for gasket.
- Make sure to set the gasket for glass on the case side.



- Set the projection of dial in the groove of dial ring.



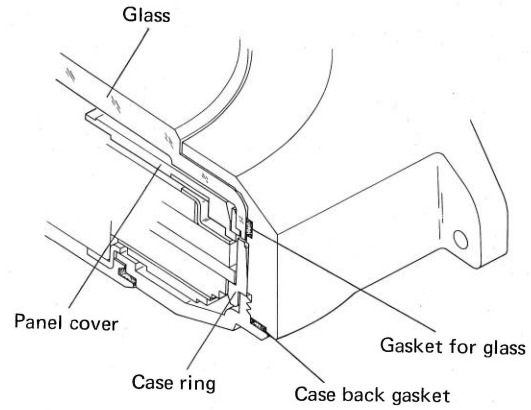
- Be sure to push the crown slowly into position so that the gasket for crown may be not scratched.

Screw-22

1. Construction

1-1. Construction of Glass Portion

The acrylic glass is fixed to the caseband by the gasket for glass and the panel cover.



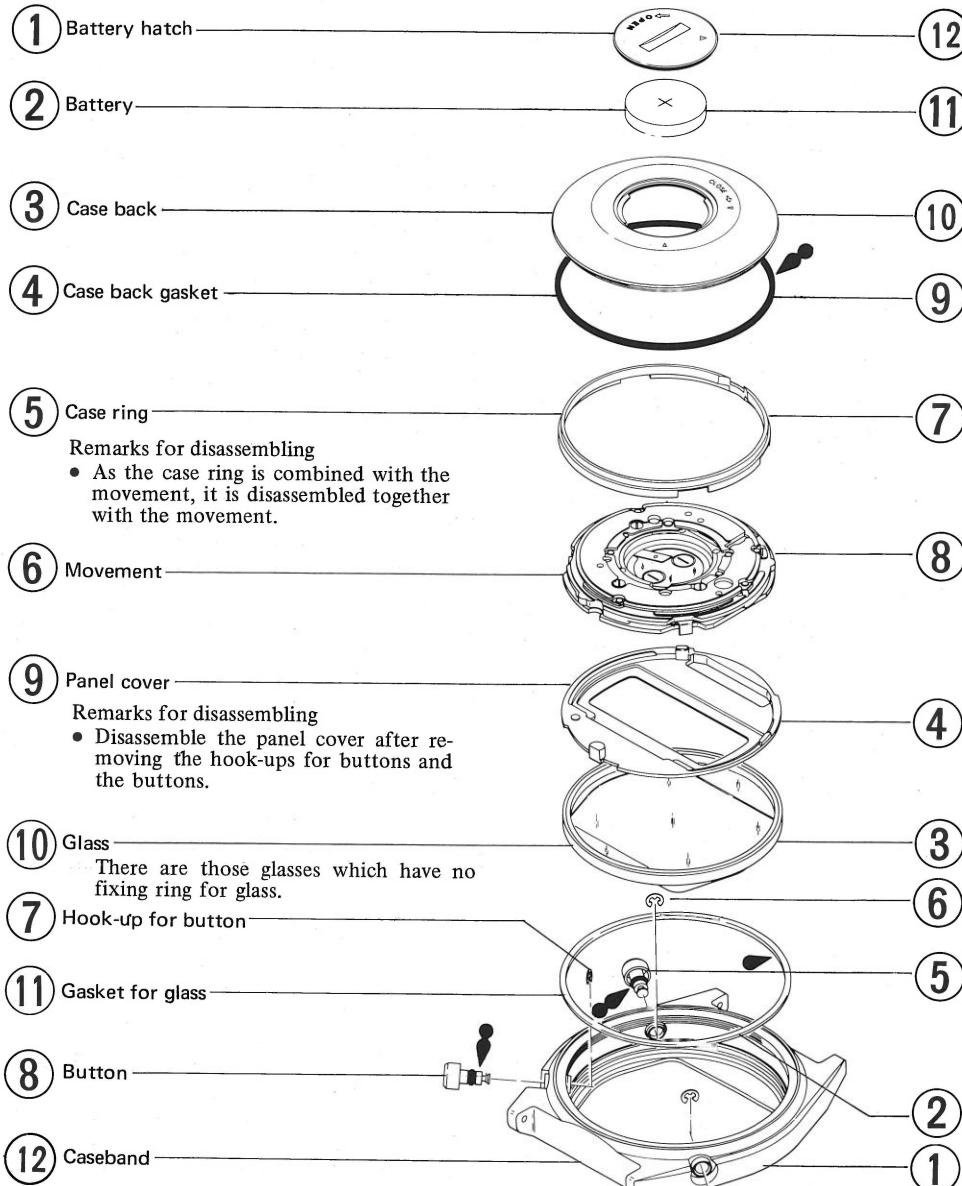
2. Lubricating

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points.

Type of oil	Oil quantity
Silicon grease 500,000 c.s.	Normal quantity Extremely small quantity

3. Disassembling and reassembling

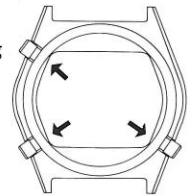
< Disassembling procedures >



< Reassembling procedures >

7 Remarks for reassembling
 • Reassemble together with the movement after setting in the movement.

8 Remarks for reassembling
 • Be sure to push out the buttons before setting the movement in position.



4 Remarks for reassembling
 • Push in by using S-220.

5 Remarks for reassembling
 • Reassemble the buttons and the hook-ups for buttons after setting the panel cover in position.

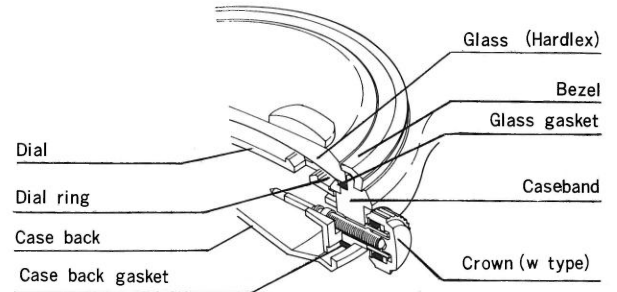
2 Remarks for reassembling
 • Apply a small quantity of silicon grease inside the gasket for glass.

1 Construction

Glass : Hardlex

Case back : Snap type

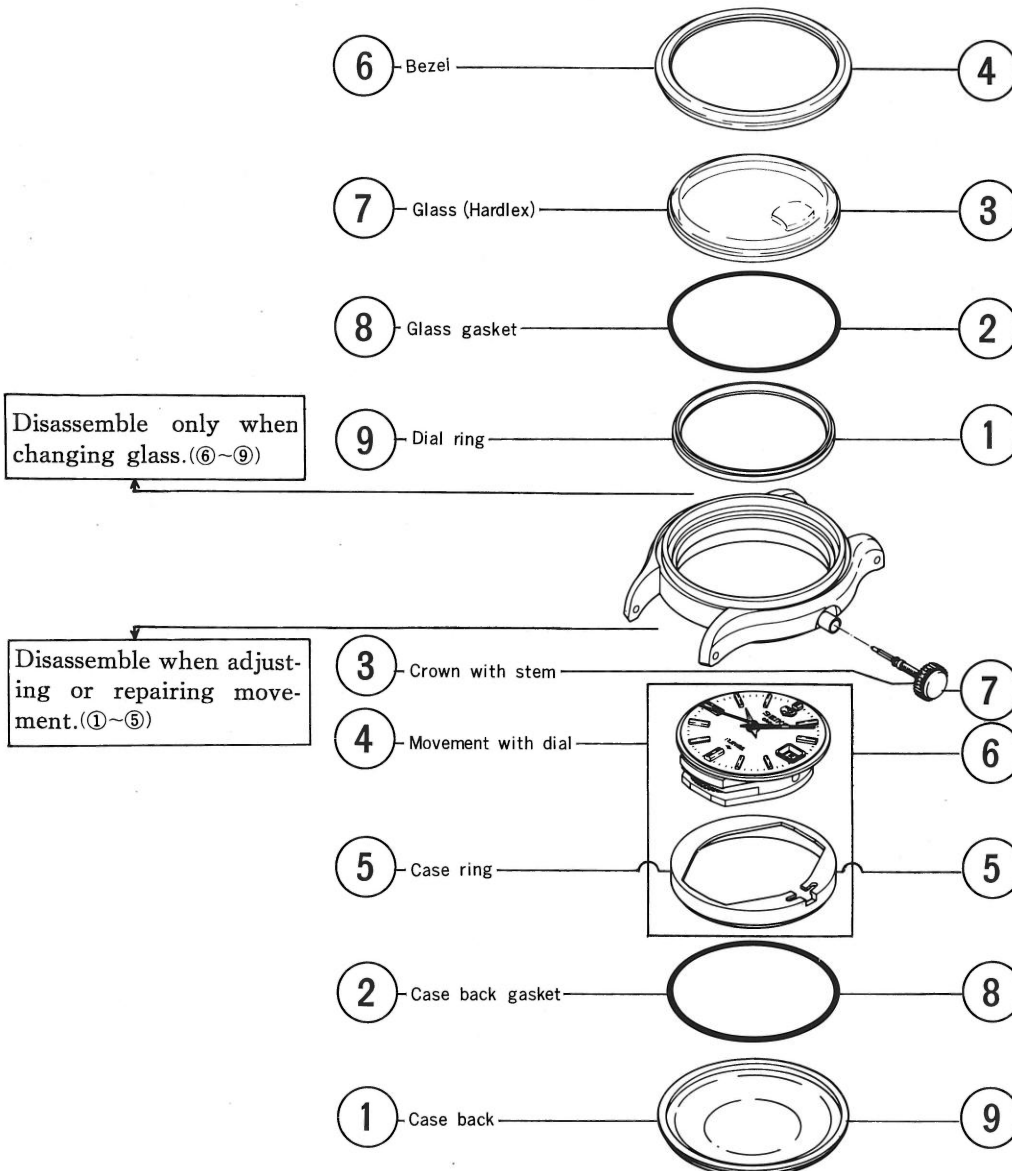
Crown : W type



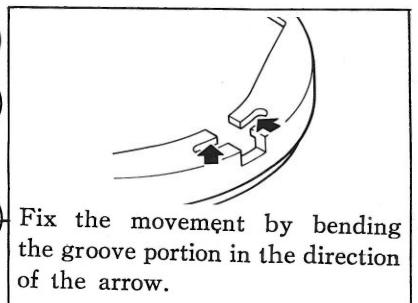
2 Disassembling and assembling

Disassembling procedures

Assembling procedures



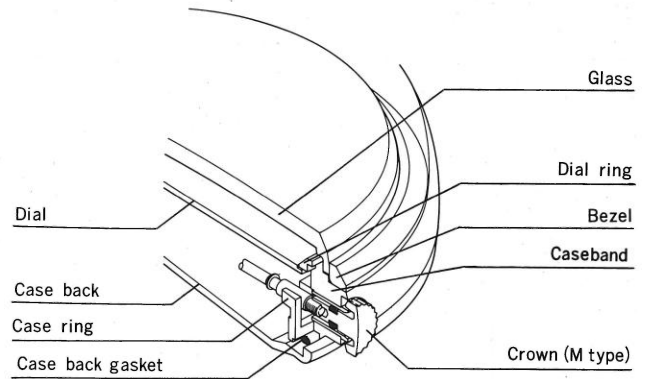
Note) Apply silicon grease 500,000 c.s. to crown gasket.



Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of caseband when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

1. Construction

Glass: Hooped type
 Case back: Snap type
 Crown: M type



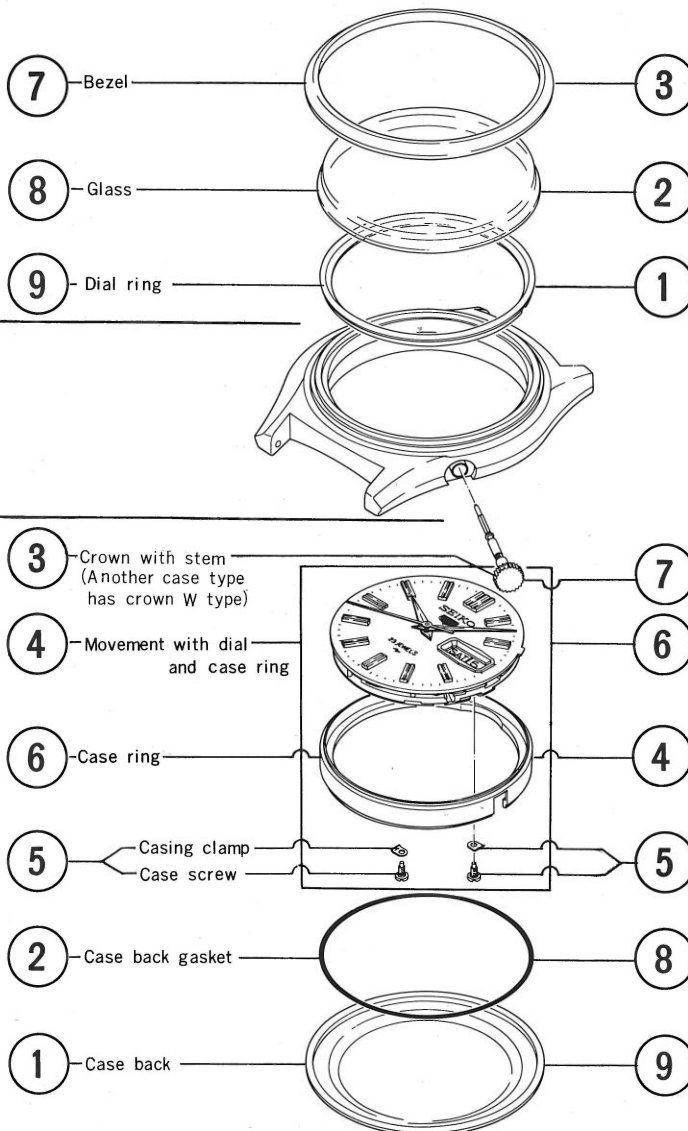
2. Disassembling and assembling

Disassembling procedures

Assembling procedures

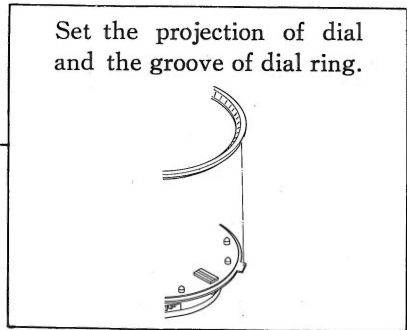
Disassemble only when changing glass. (⑦~⑨)

Disassemble when adjusting or repairing movement. (①~⑥)



Another case type has no dial ring.

Note)
 Apply silicon grease 500,000 c.s. to crown gasket.



Another case type has no casing clamp or case screw.

Note) 1. Replace gasket when scratched or deformed.
 2. Insert gasket into the groove of caseband when reassembling.
 3. Apply silicon grease 500,000 c.s. to gasket.

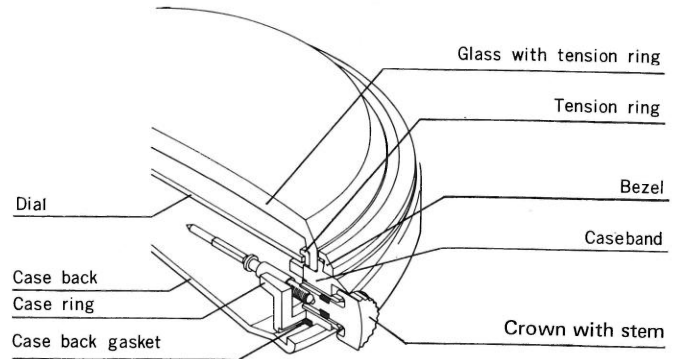
Snap-3

1. Construction

Glass: Tension ring type

Case back: Snap type

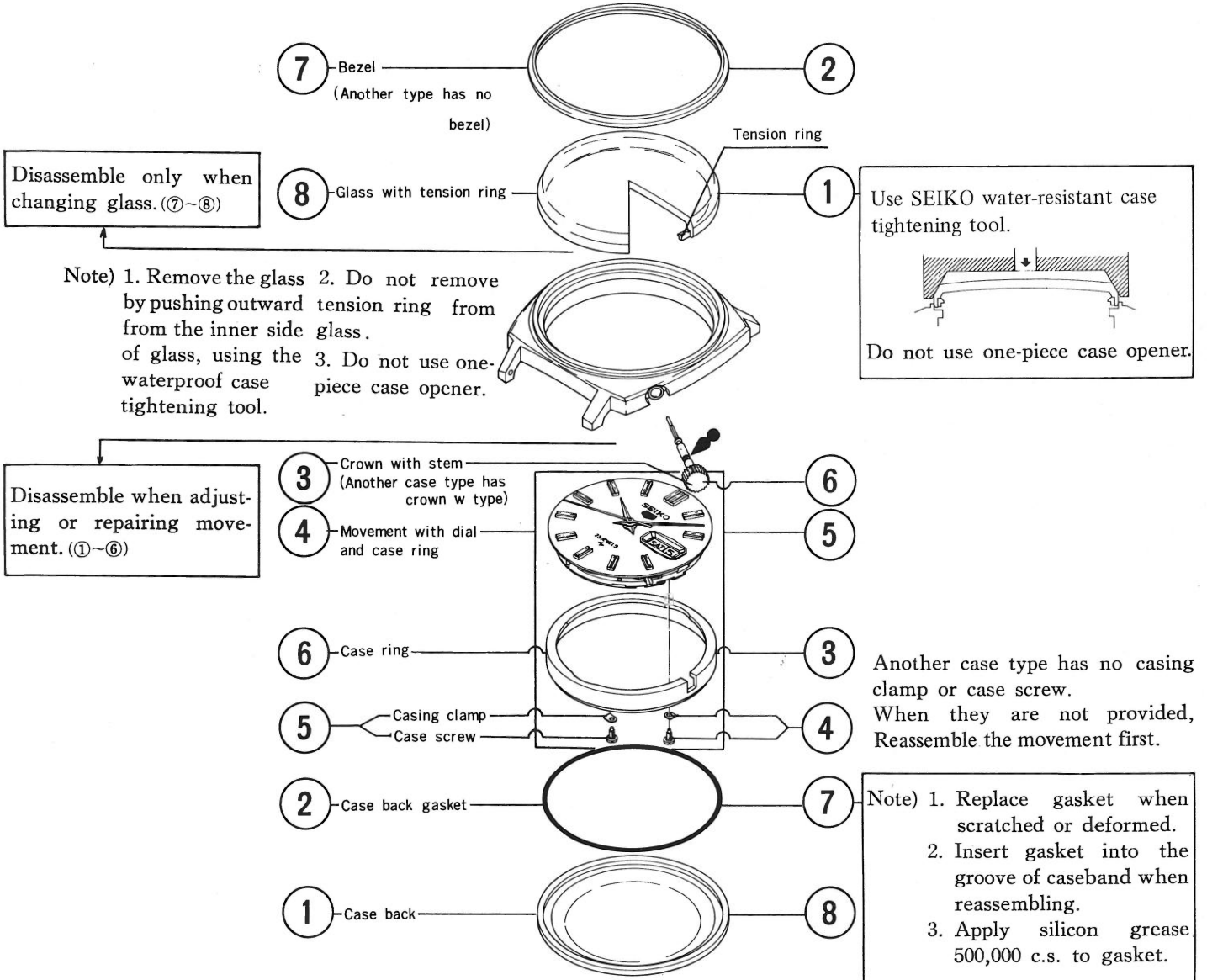
Crown: M type



2. Disassembling and Reassembling

Disassembling procedures

Reassembling procedures



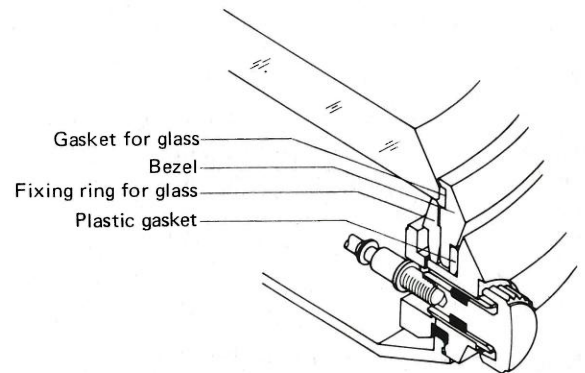


Snap-4

Casing – continued

1. Construction

Glass: Hardlex
 Case back: Snap or Screw type
 Crown: M type

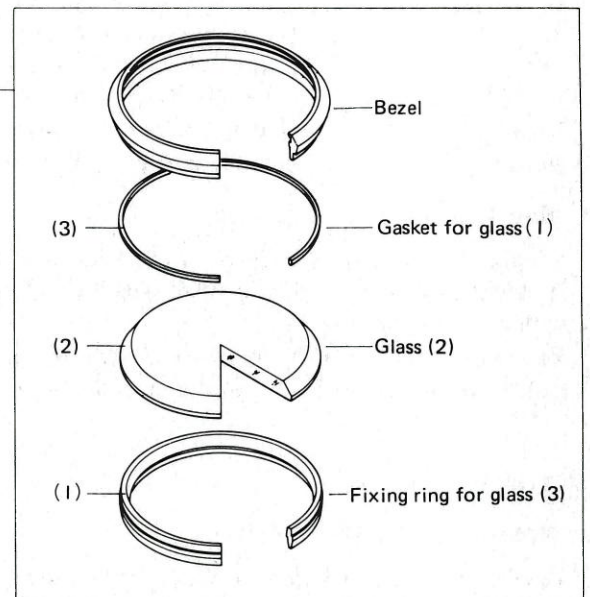
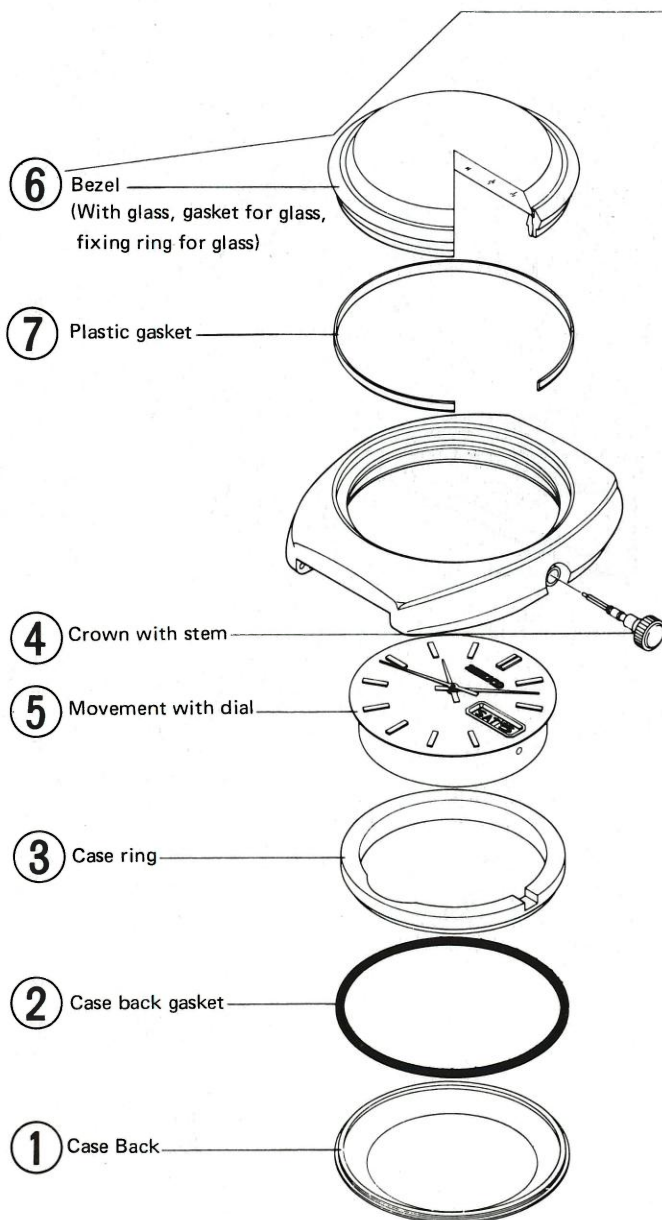


2. Disassembling and reassembling

Disassembling procedures Figs. (1) ~ (7)

Reassembling procedures Figs. (7) ~ (1)

Disassembling and reassembling procedures of glass portion



How to remove the glass

1. How to remove the glass with bezel

Use SEIKO water-resistant case tightening tool (S-220) and select a supporting disk with larger diameter than the bezel and a suitable inserting disk (S-160) to fit the fixing ring diameter. ①

Remove the glass from the inner side by pushing the fixing ring for glass. Be careful not to scratch the glass surface.

2. How to remove the glass from the bezel

As shown in the illustration, push out the glass with fingers. ②

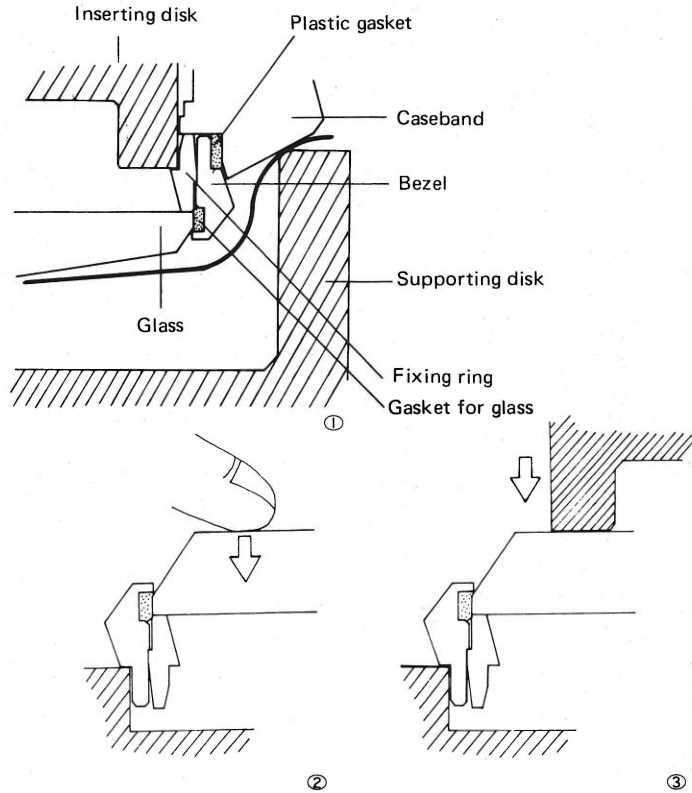
If the glass can not be removed, select the inserting disk with smaller diameter for glass and push the glass down by using the SEIKO water-resistant case tightening tool (S-220) as shown in the illustration. ③

Usually, it is not necessary to remove the gasket for glass. Clean only the contacting portion with the glass.

3. How to remove the plastic gasket

Should the plastic gasket adhere to the inner case, raise it slightly by using a thin wooden stick or toothpick with a beveled tip. ④

Be careful not to scratch the gasket. Should the plastic gasket adhere to the bezel, remove it with fingers.



How to fix the glass

1. How to fix the gasket for glass

Usually it is not necessary to remove the gasket, and never use a gasket again, which has been already used. Do not mistake the gasket for glass upper with the lower side. ⑤

2. Apply silicon grease around the glass circumference

It facilitates to fix the glass into the bezel. ⑥

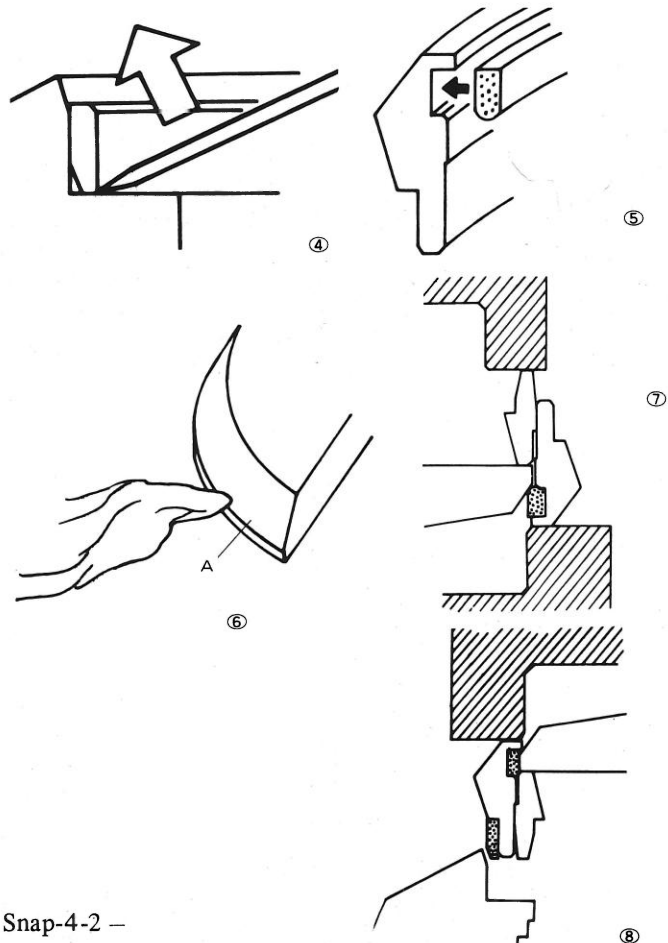
3. How to fix the glass to the bezel

After ascertaining the gasket is placed in the groove of the bezel and place the glass on the gasket.

Push the fixing ring for glass by using a suitable inserting disk (S-160) as shown in the illustration. Never push the glass only. ⑦

4. How to fix the glass with bezel

Push the bezel in the case body by using the SEIKO water-resistant case tightening tool (S-220) as shown in the illustration. ⑧



Snap-5

1. Construction

1-1 Construction of Glass Portion

The gasket for glass is pushed to the caseband by the glass which is supported by the panel cover.

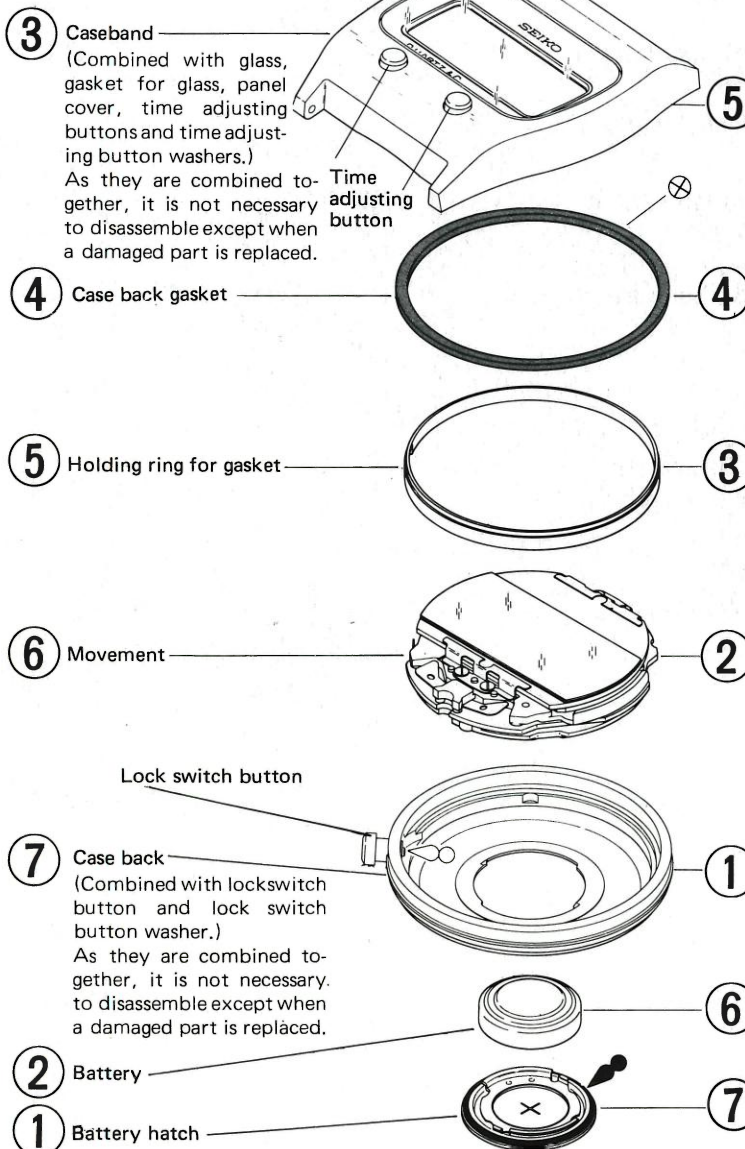
2. Lubricating

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating portions.

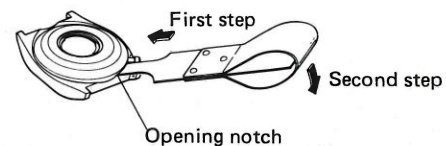
Type of oil	Oil quantity
○ SEIKO Watch Oil S-6	○ Normal quantity
● Silicon grease 500,000 c.s.	○ Small quantity
	Never lubricate the portions marked ⊗

3. Disassembling and reassembling

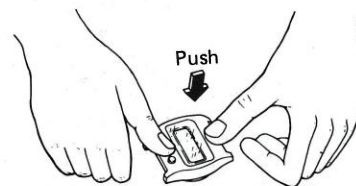
<Disassembling procedures>



How to remove the caseband



How to snap close the caseband



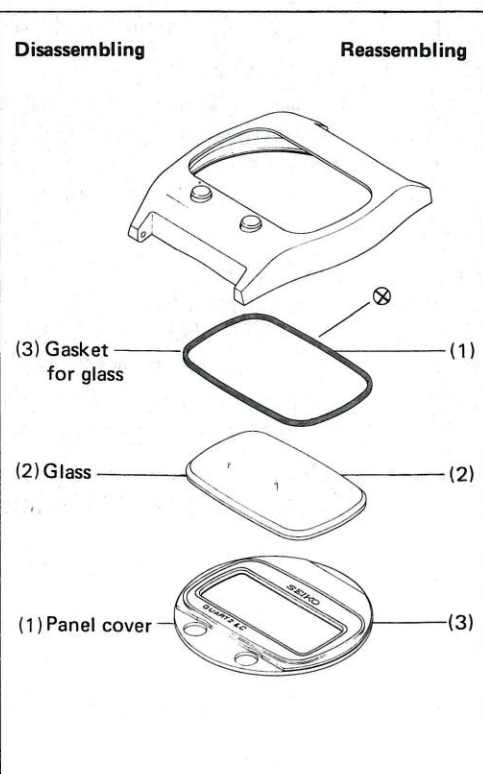
Remarks:

- Be sure that the gasket is fixed in the groove correctly before the caseband is snapped closed.
- Be careful not to push the glass.

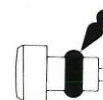
<Reassembling procedures>

Disassembling and reassembling procedures of the glass portion

- Refer to Page 2.



Remarks:



When the buttons are replaced with new ones, reassemble them after lubricating the portions as illustrated above.

Snap-5

3-1 How to remove the glass

Remove the glass with the inserting disk which is contained in the S-160 disk unit.

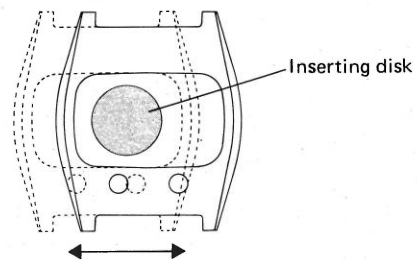
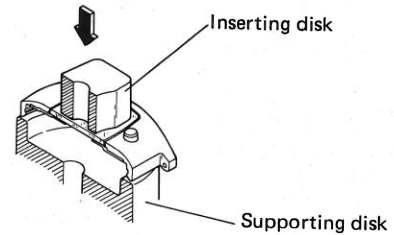
Inserting disk:

ϕ 16.5 mm (diameter) or S-161 specially designed for removing the glass

Supporting disk:

ϕ 30.0 ~ 36.0 mm (diameter)

When the inserting disk with the diameter of ϕ 16.5 is used, do not push the glass in the center but rather left and right with the inserting disk while moving the caseband. This will enable to remove the glass without damaging the panel cover.



3-2 How to reassemble the glass

1) Fix the gasket for glass.

Fix the gasket in the groove. (Do not apply silicon grease on it.)

Be careful with the front and back of the gasket.

2) Set the glass

Be careful with the front and back of the glass.

3) Set the panel cover

Place the panel cover on the caseband so that its time adjusting buttons are fixed into the holes of the panel cover. Be sure to check from the front side that the panel cover is set in the correct position.

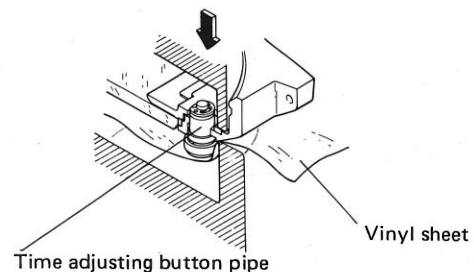
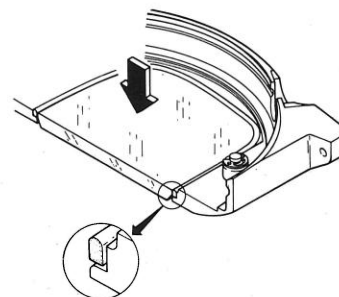
4) Set the panel cover

(Use the tightening tool S-220)

Place the inserting disk on the panel cover so that it doesn't touch the time adjusting button pipe. Place a vinyl sheet between the watch and supporting disk so as not to scratch the watch.

Inserting disk: ϕ 26.5 mm (diameter)

Supporting disk: ϕ 27.0 ~ 30.0 mm (diameter)



Snap-6

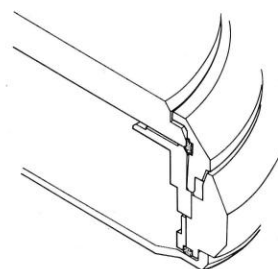
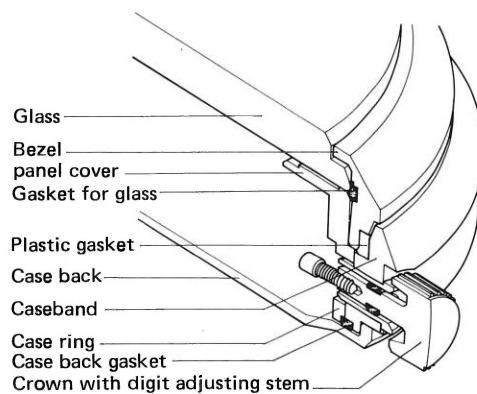
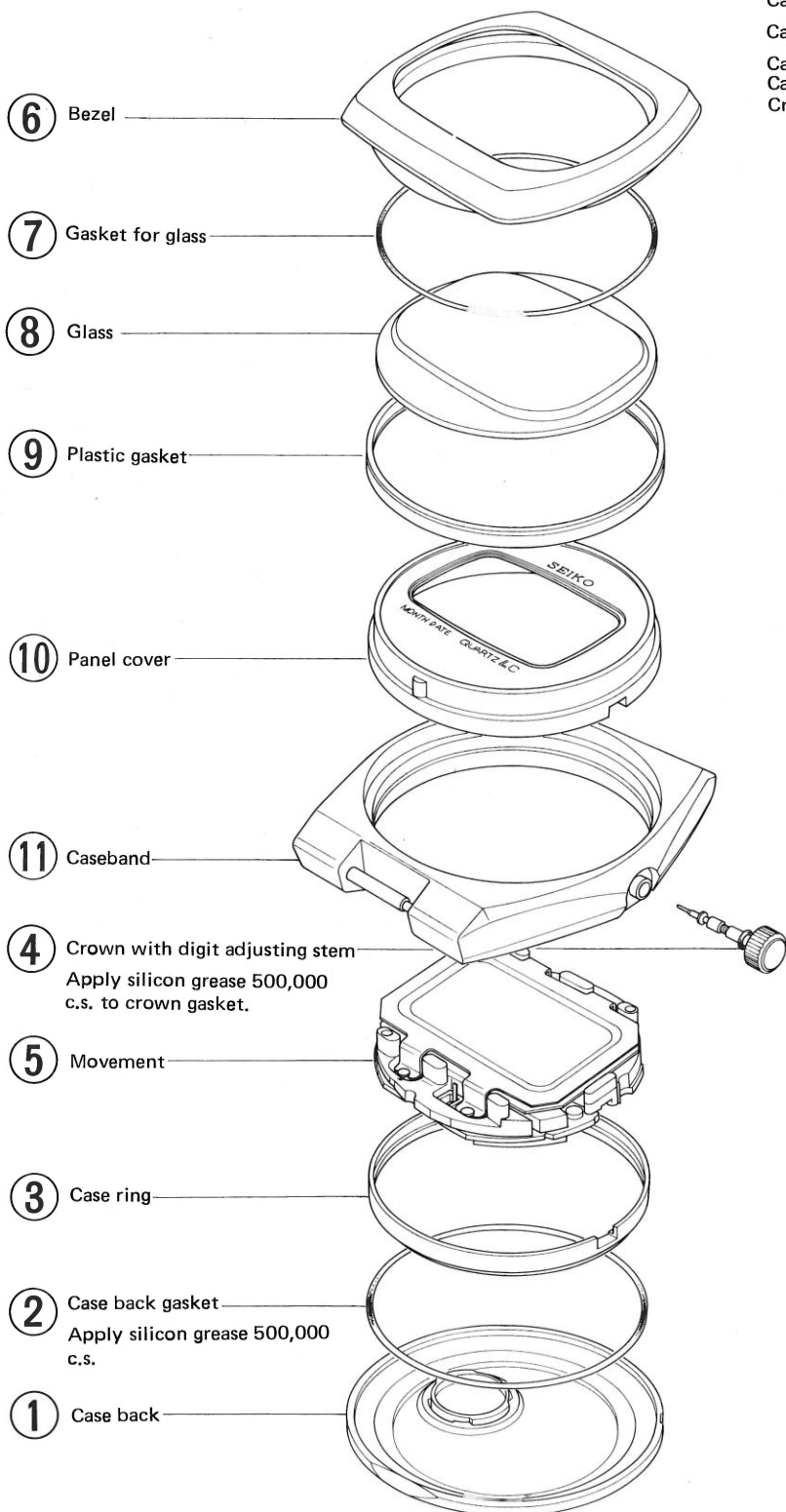
1. Construction of glass portion

The glass is pushed to the bezel by the gasket for glass and it is also pushed up by the panel cover.

2. Disassembling and reassembling

Disassembling procedures Figs. ① ~ ⑪

Reassembling procedures Figs. ⑪ ~ ①



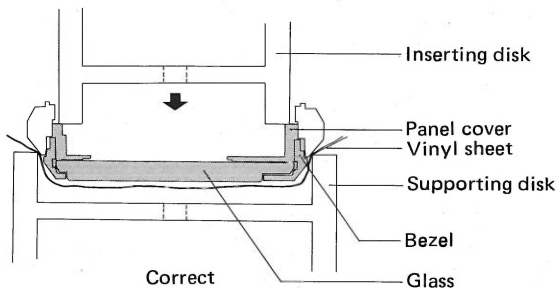
Snap-6

3. How to remove and reassemble the glass and bezel

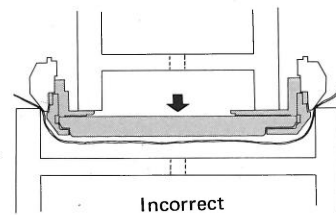
3-1 How to remove the bezel

- (1) Place the caseband on the supporting disk and the inserting disk which is contained in the S-160 disk unit on the panel cover as shown in the illustration and remove the glass with combined parts.

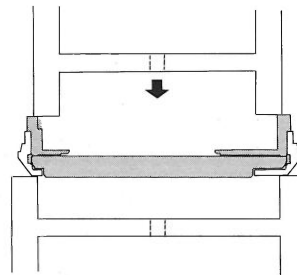
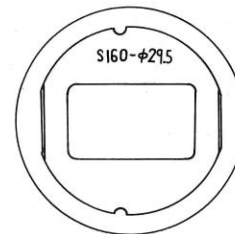
Be sure to place the groove of the inserting disk on the digit adjusting stem pipe of the caseband.



Be careful not to push the inside surface of the panel cover directly by the inserting disk or it is damaged.



- (2) The size of the inserting disk to be used is inscribed on the back of the panel cover. Be sure to select the inserting disk which is the same size as inscribed on the back of the panel cover. (See the illustration on the right)

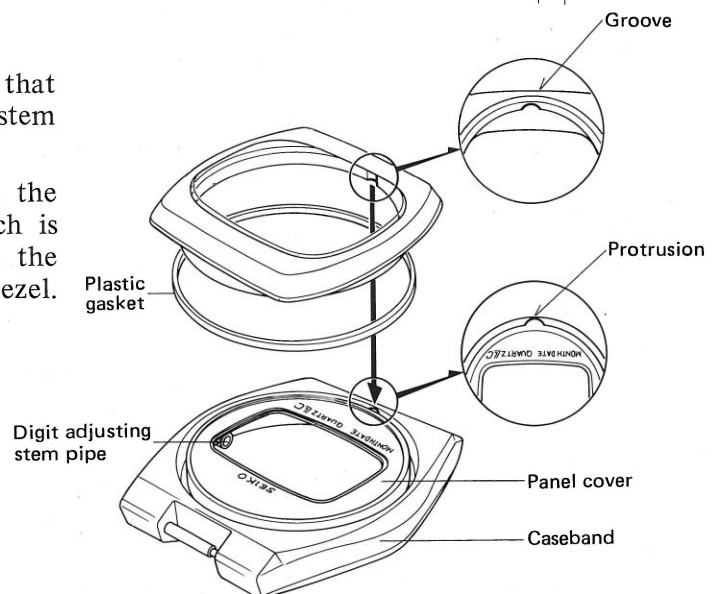
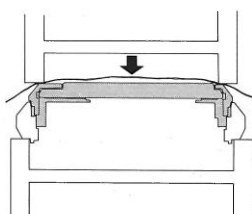


3-2 How to reassemble the glass

Fix the gasket for glass to the bezel, and push the glass into the bezel by pushing the panel cover as shown in the illustration.

3-3 How to reassemble the bezel

- (1) Place the panel cover on the caseband so that its groove is fixed on the digit adjusting stem pipe.
- (2) Place the bezel with plastic gasket on the panel cover so that its protrusion which is indicated in the illustration is fixed in the groove of the bezel and push in the bezel.



Snap-7

1. Construction

1-1. Construction of Glass Portion

The glass is fixed to the caseband by the plastic gasket.

1-2. Construction of Case Back

The protrusion of outer circumference of the case back is fixed in the groove of the caseband.

2. Lubricating

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points.

Type of oil	Oil quantity
● Silicon grease 500,000 c.s.	∞ Normal quantity

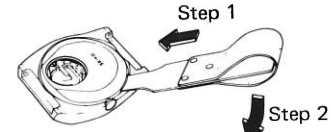
3. Disassembling and reassembling

See next page for disassembling and reassembling of the glass portion.

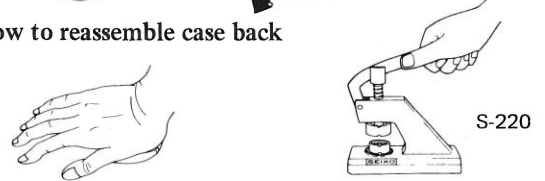
How to disassemble the case back

Remarks:

- Be sure to put a vinyl sheet on the tip of the case opener before inserting it into the opening notch not to scratch the caseband and the case back.



How to reassemble case back

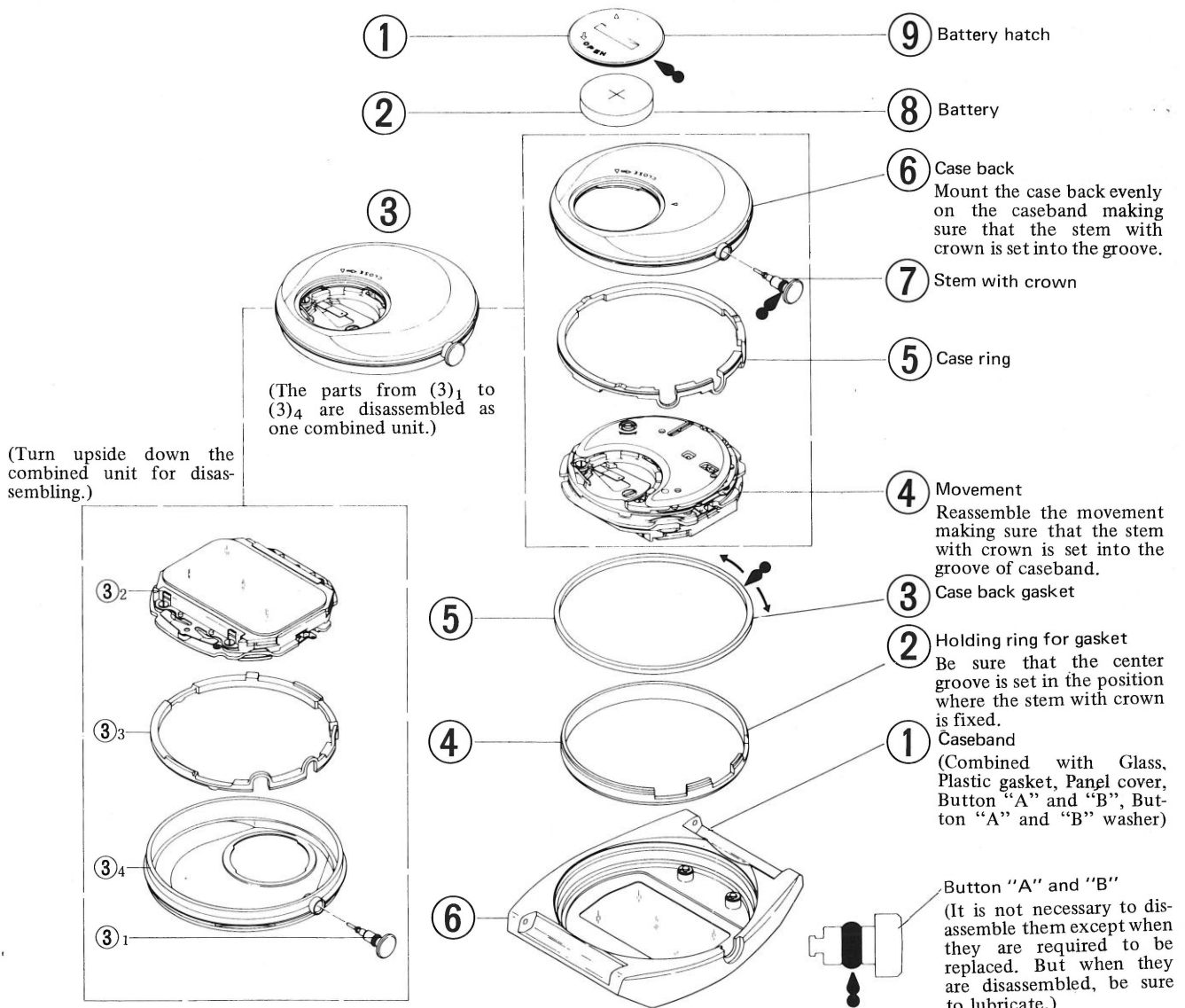


Remarks:

- Be sure to place the watch with its glass side down and push the case back with your hand so that the case back is snapped closed to the caseband firmly or use the SEIKO tightening tool S-220.
- Be sure to reassemble the parts ② - ⑨ into the caseband for easy reassembling or the case back gasket will be twisted.

<Disassembling procedures>

<Reassembling procedures>



Snap-7

3-1. How to disassemble the glass

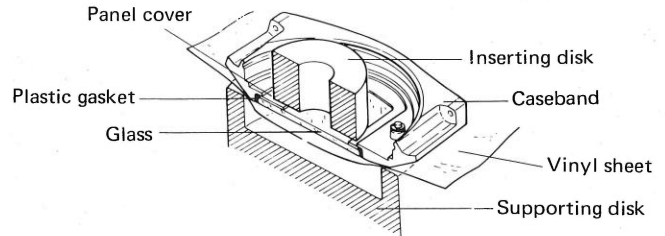
- Remove the glass by using the case tightening tool S-220.

Inserting disk: Select the inserting disk contained in the S-160 Disk unit, whose diameter is smaller than that of the caseband, or use the S-161 Disk specially designed to disassemble the glass.

Supporting disk: Select the supporting disk whose diameter is larger than that of the glass.

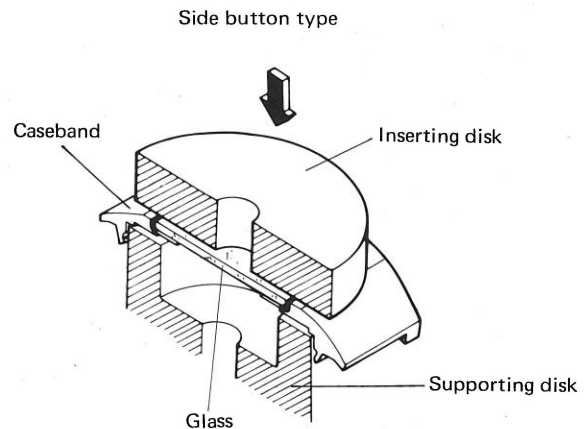
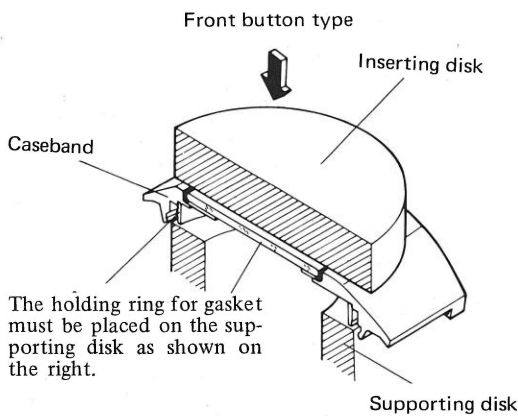
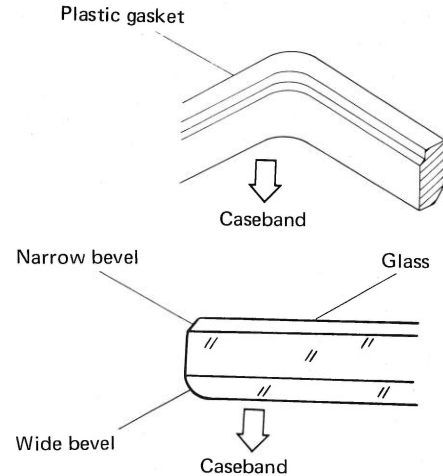
- Place a vinyl sheet between the supporting disk and the glass as shown in the illustration.
- Push the glass together with the panel cover for disassembling.

(When the S-161 is used for removing the glass, the glass can be removed by pushing it directly with the inserting disk for certain type of the model.)



3-2. How to reassemble the glass

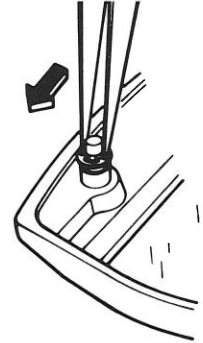
- Set the plastic gasket.
 - Be sure to replace it with a new plastic gasket.
 - Do not mistake the upper side of the gasket for the lower side.
- Set the panel cover.
 - Be sure to fix the back side of the panel cover firmly to the caseband.
- Place the glass.
 - Do not mistake the upper side (narrow bevel) of the glass for the lower side (wide bevel) which fits into the caseband.
- Fix the glass. (Use the S-220)
 - Inserting disk: Plastic supporting disk (S-173)
 - Supporting disk: The supporting disk is used in different way for the front button type watch or the side button type watch.



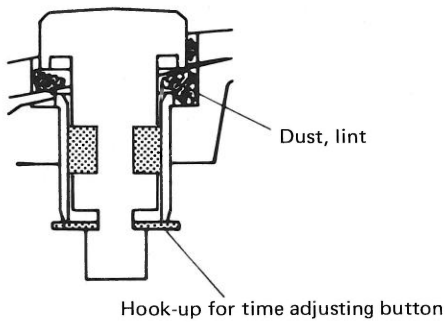
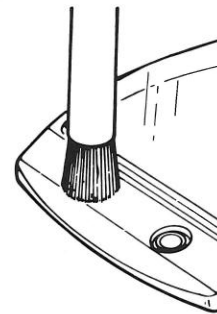
Snap-7

3-3. Disassembling and reassembling of the time adjusting button

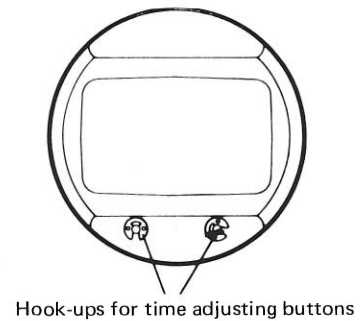
- 1) Disassemble the time adjusting button
Disassemble the hook-up for time adjusting button first and then the time adjusting button.



- 2) Wipe dust and lint off the time adjusting button
Wipe dust and lint off with a soft brush.



- 3) Reassemble the time adjusting button
Check to see if the hook-ups for time adjusting buttons are set firmly by trying to turn them after setting them in position.





Snap-8

1. Construction

1-1. Construction of Glass Portion

The glass is fixed to the caseband by the plastic gasket.

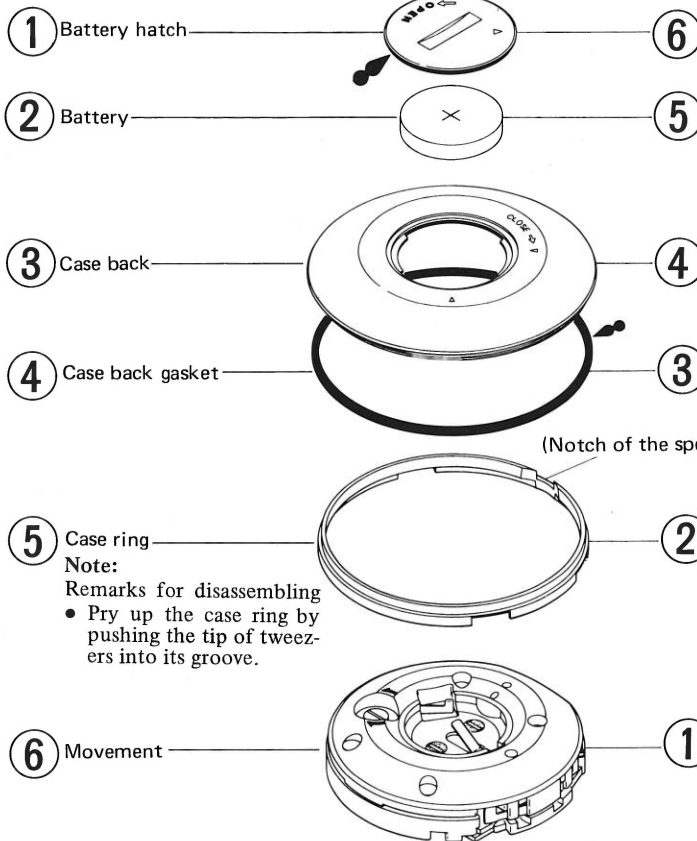
2. Lubricating

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating portions.

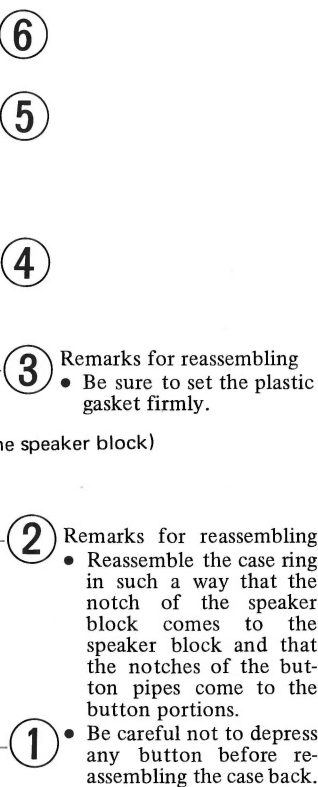
Type of oil	Oil quantity
▶ Silicon grease 500,000 c.s.	∞ Normal quantity

3. Disassembling and reassembling

< Disassembling procedures >



< Reassembling procedures >



5 Case ring
Note:
 Remarks for disassembling
 • Pry up the case ring by pushing the tip of tweezers into its groove.

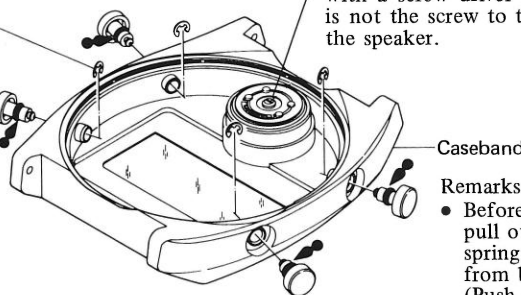
3 Remarks for reassembling
 • Be sure to set the plastic gasket firmly.

2 Remarks for reassembling
 • Reassemble the case ring in such a way that the notch of the speaker block comes to the speaker block and that the notches of the button pipes come to the button portions.

1
 • Be careful not to depress any button before reassembling the case back.

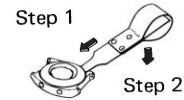
(Speaker block)
 Do not turn this portion with a screw driver as this is not the screw to tighten the speaker.

(Hook-up for button)
 (Button)
 It is not necessary to disassemble the buttons and hook-ups for buttons (4 portions) except when they are required to be replaced.



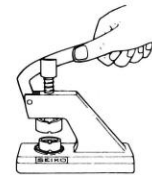
Remarks for reassembling
 • Before reassembling the movement, pull out all buttons so that the switch spring do not prevent the movement from being reassembled.
 (Push the buttons from the inside with the tips of tweezers.)

How to pry up the case back



Use the case opener with a narrow tip for easy opening of the case back.

How to reassemble the case back



S-220

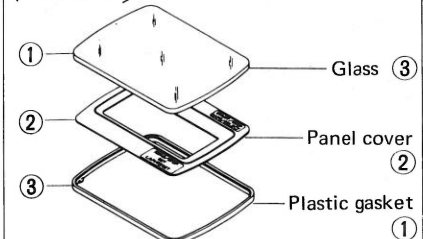
Reassemble the case back by using an inserting disk whose outside diameter matches that of the case back. Depress the brim of the case back.

Inserting disk:
 φ 29.0 or φ 29.5
 Supporting disk:
 Flat disk S-173

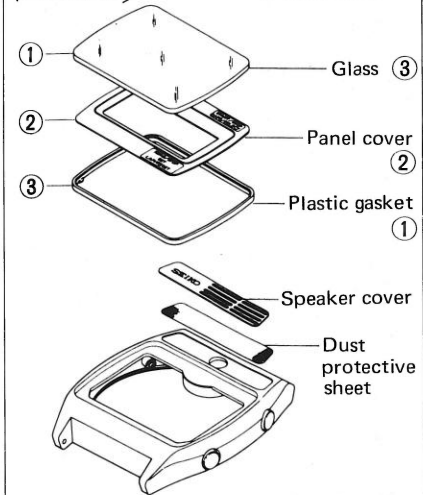
Glass and speaker portions

It is not necessary to disassemble the glass and the speaker cover except when they are required to be replaced.

< Disassembling procedures >



< Reassembling procedures >

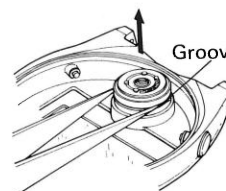


See the following pages for the disassembling and reassembling procedures for the glass and the speaker cover portions.

How to disassemble the speaker block

(It is not necessary to disassemble it except when it is required to be replaced.)

- Hold the speaker block at its groove by the tips of the tweezers and pull out the speaker block from the caseband.
- Or pry out the speaker block by pushing up on its outer edge evenly with a tip of screw driver.

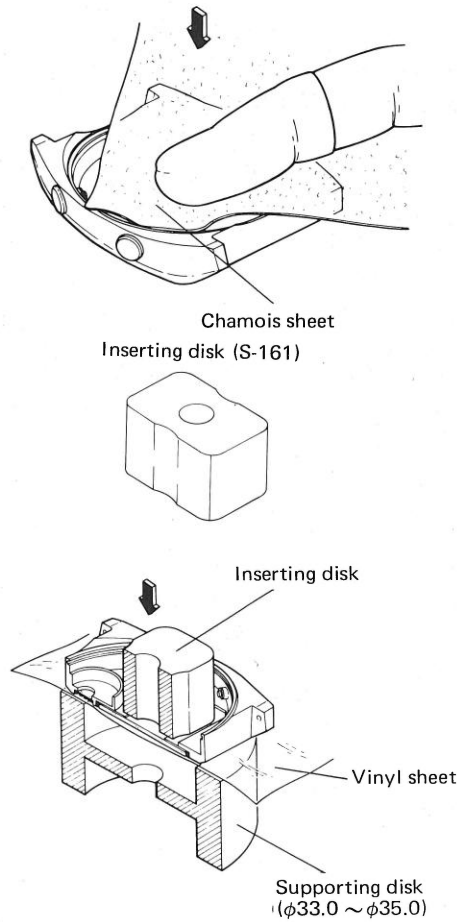


Snap-8

3-1. How to disassemble the glass

(Do not disassemble the glass except when the replacement of the glass and the panel cover is necessary.)

- Place a chamois sheet on the inside of the caseband and push the glass outward with a finger for disassembling.
- Use S-220 if it is impossible to remove the glass by pushing it with a finger.
 - Inserting disk: S-161
 - Supporting disk: $\phi 33.0 \sim \phi 35.0$
- Place a vinyl sheet between the glass and the supporting disk as shown in the illustration.
- Remove the glass together with the panel cover.



3-2 How to reassemble the glass

(1) Set the plastic gasket

- Be sure to replace the plastic gasket with a new one.
- Be careful not to mistake the upper side for the lower side.

(2) Set the panel cover

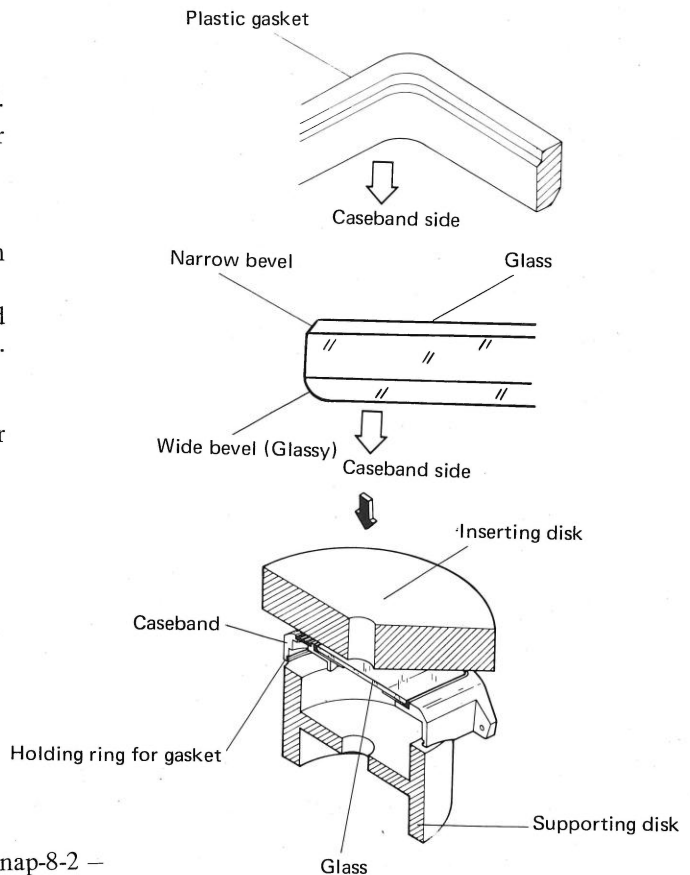
- Be sure to set the back side of the panel cover in position of the caseband firmly.
- Make sure that the space between the caseband and the edge of the panel cover is uniform in width.

(3) Place the glass

- Be careful not to mistake the upper side for the lower side.

(4) Fix the glass (use S-220)

Inserting disk: Flat disk (S-173)
Supporting disk: $\phi 28.0$ or $\phi 28.5$



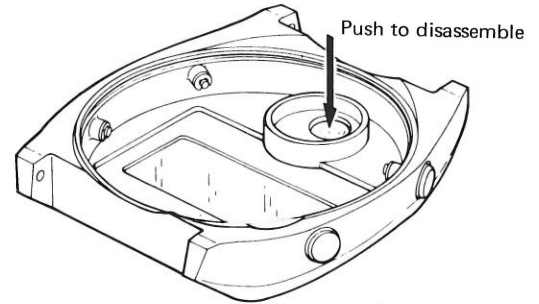
Snap-8

3-3. How to replace the speaker cover

(The speaker cover and the dust protective sheet are attached to the caseband with adhesive. It is not necessary to disassemble the speaker cover and the dust protective sheet except when they are required to be replaced. When replacing the speaker cover, be sure to replace the dust protective sheet, too.)

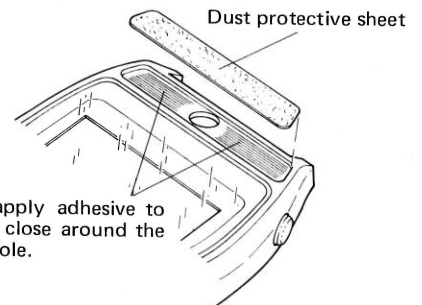
• How to disassemble the speaker cover

- i) Disassemble the speaker
Refer to "Snap 8-1" for the disassembling procedures of the speaker.
- ii) Disassemble the speaker cover by pushing it through the speaker hole inside the caseband.
(Use the stake of the staking tool for disassembling.)
- iii) Remove the dust protective sheet attached to the caseband with a cloth moistened with alcohol.
Remove the adhesive on the caseband by the tip of a large screw driver if it is difficult to remove it with a cloth moistened with alcohol.

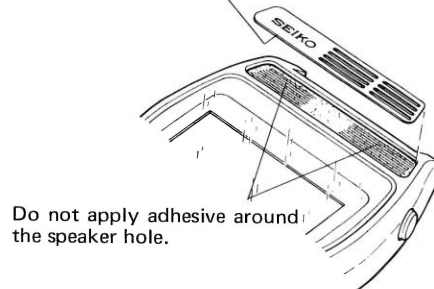


• How to reassemble the speaker cover

- i) Apply adhesive to the speaker cover portion of the caseband. Be careful not to apply adhesive to the areas close around the speaker hole.
- ii) Stick the dust protective sheet on to the caseband.
- iii) Apply adhesive over the dust protective sheet attached to the caseband. Be careful not to apply adhesive to the areas close around the speaker hole.
- iv) Apply adhesive to the back side of the speaker cover, while making sure not to apply it around the speaker hole. Be careful not to let adhesive come out the back of the speaker cover.
- v) Stick the speaker cover on to the caseband. Fix the speaker cover by holding it with a clip.



Apply adhesive to the back side of the speaker cover. (Be careful not to let adhesive come out the back of the speaker cover.)





Square-type-1

1. Construction

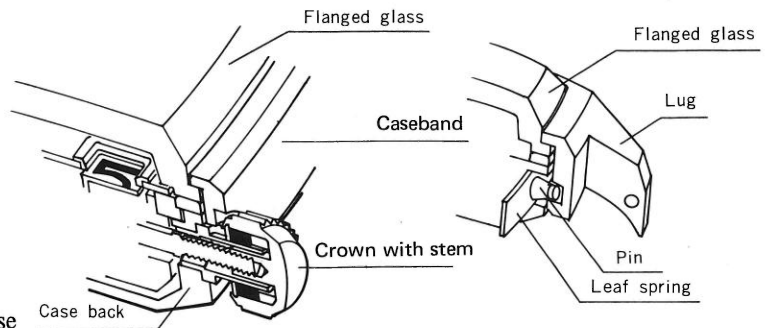
Case: Two-piece case (consisting of a combined caseband and bezel and a back)

Glass: Flanged glass

Crown: W type

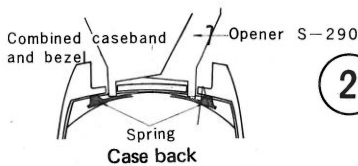
Feature

By pressing four pins on the leaf springs attached to the case back into cavities in the caseband, the caseband is fastened to the case back. Since the flanged glass and glass gasket are depressed at the same time, a watertight condition is completely maintained.



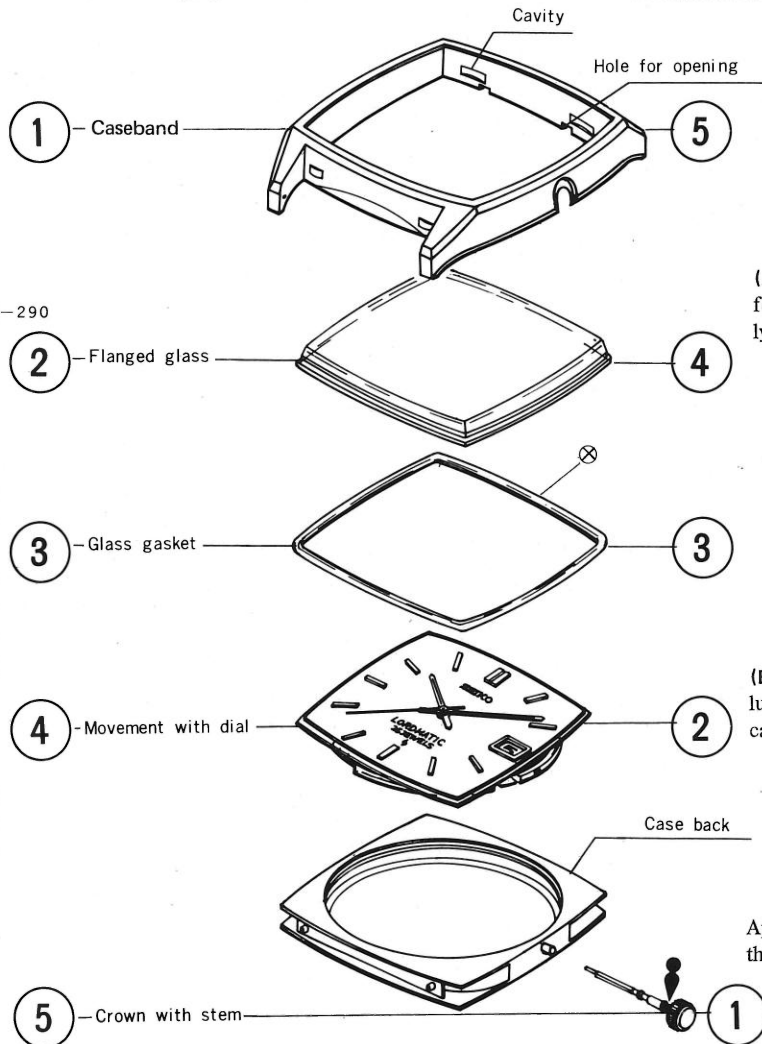
2. Disassembling and Reassembling

Disassembling procedures

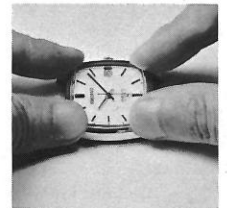


As shown in the photo, while pushing the glass, push down the leaf spring with the opener S-290 (or screwdriver) inserted in the hole for opening, in turn, thereby detaching the caseband and the case back.

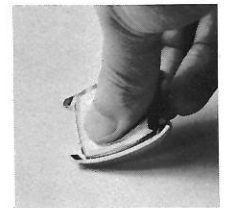
Pull out the crown, using a pair of tweezers to depress the lever for unlocking stem.



Reassembling procedures



(A) Fit the caseband by pressing the four portions of the lug surface uniformly with the finger tips.



(B) Further, press hard over the every lug with fingers, and make sure that the caseband is securely fitted.

Apply silicon grease (500,000 c.s.) to the crown gasket.

Square-type-2

Casing-continued

1. Construction

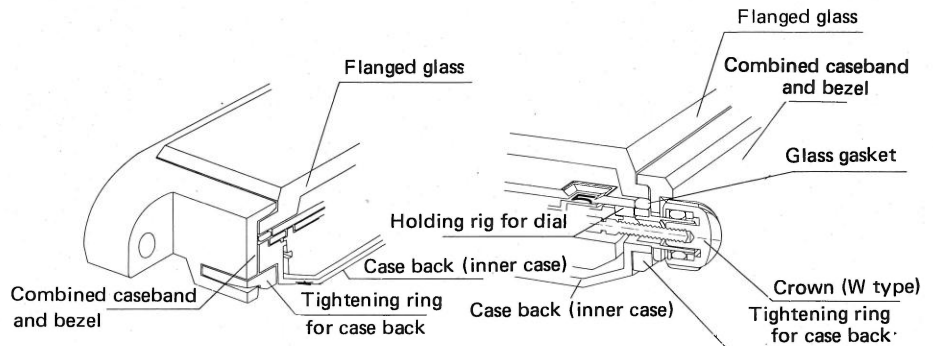
Case: Two-piece case (consisting of a combined caseband and bezel and a back)

Glass: Flanged glass

Crown: W type

Feature

By turning the two projected ends of the tightening ring for case back in the grooves at 6 and 12 o'clock positions of the combined caseband and bezel, a watertight condition is completely maintained, as it simultaneously presses the case back, glass gasket, and flanged glass.



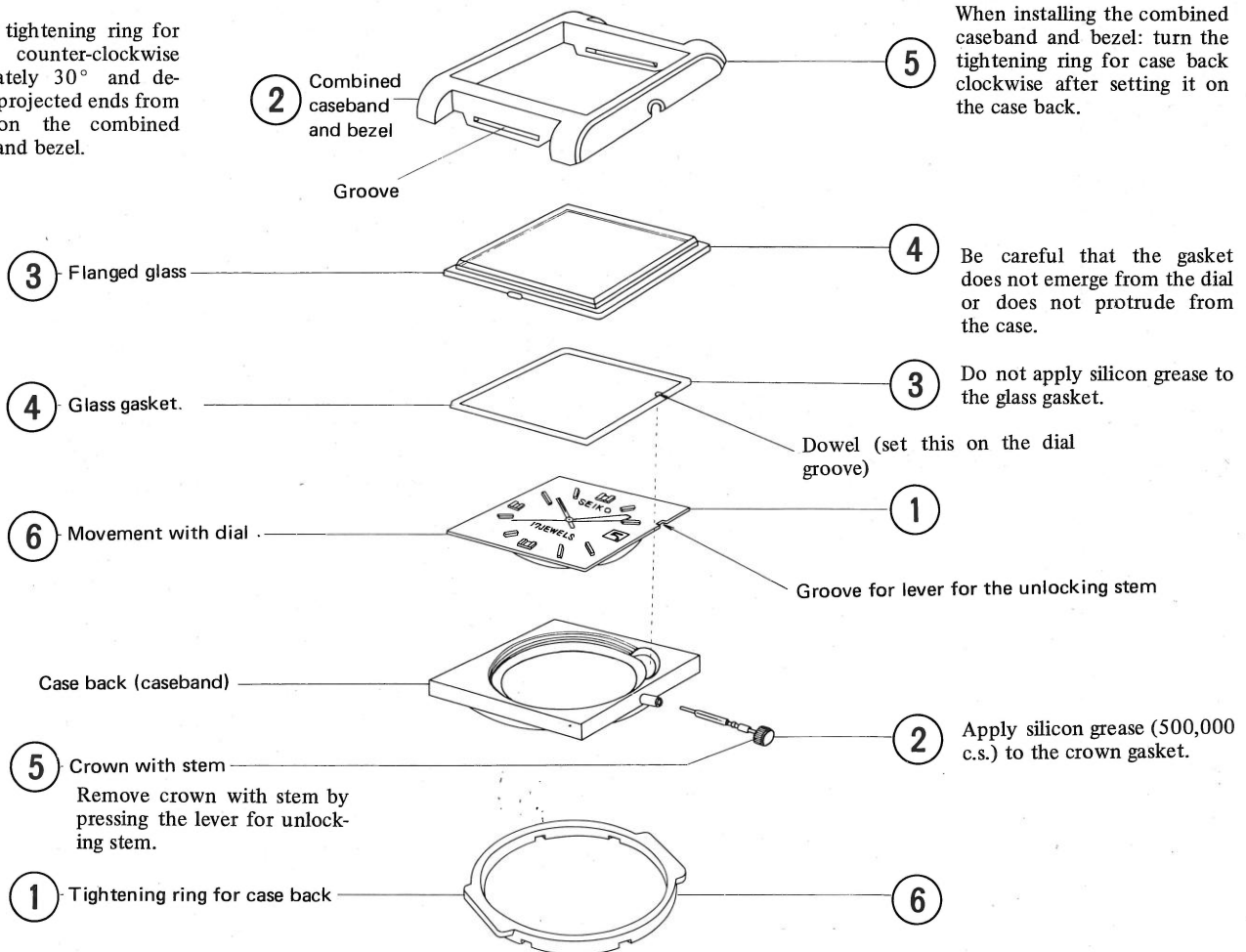
2. Disassembling and assembling

Disassembling procedures

Turn the tightening ring for caseback counter-clockwise approximately 30° and detach two projected ends from grooves on the combined caseband and bezel.

Assembling procedures

When installing the combined caseband and bezel: turn the tightening ring for case back clockwise after setting it on the case back.



1. Construction

Case: Two-piece case (consisting of a combined caseband and bezel and a back)

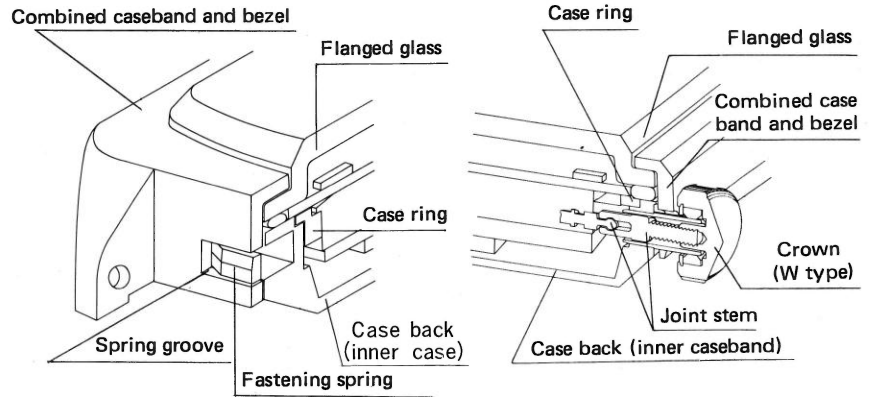
Glass: Flanged glass

Crown: W type

Feature

By securing a fastening springs installed on the case back (inner caseband) in the spring grooves at 6 and 12 o'clock positions of the combined caseband and bezel, a water resistant condition is completely maintained, as it simultaneously presses the case back, glass gasket, and flanged glass.

2. Disassembling and assembling

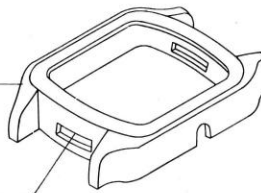


Disassembling procedures

- 1) Push the fastening spring by the tip of a driver.
- 2) Remove the combined caseband and bezel while alternately pushing up the case lugs in the directions of 6 and 12 o'clock.

① Combined caseband and bezel

Spring groove



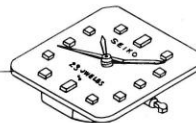
② Flanged glass



③ Glass gasket



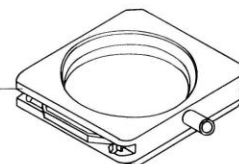
⑤ Movement with dial



⑥ Case ring



Case back (caseband)



④ Joint stem (crown portion)



③

Insert one of fastening springs in either spring groove; next, push another spring in the groove by using a driver.

Confirm that springs are correctly fastened in grooves by depressing the glass upper surface.

When the combined caseband and bezel moves, this indicates insufficient fastening.

Carefully set the glass gasket to prevent its emerging from the dial or protruding from the case. It is unnecessary to apply the silicon grease.

Apply silicon grease (500,000 c.s.) to the crown gasket.







Square-type-4 (Non water-resistant)

1. Construction

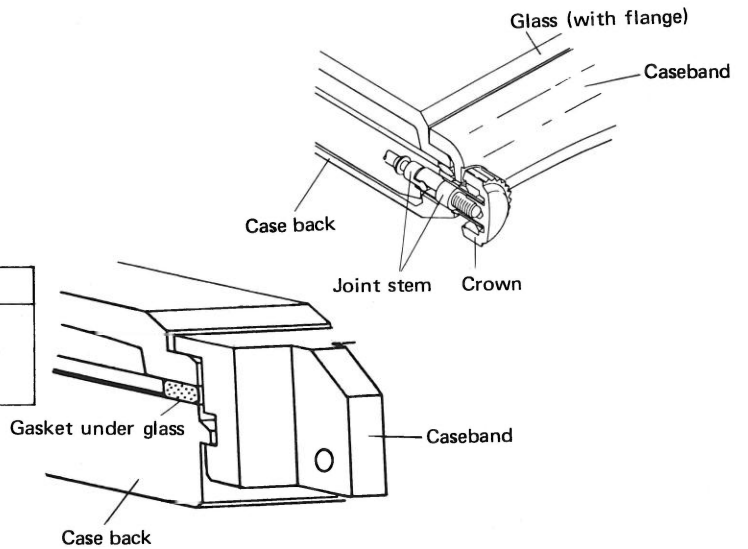
The glass and gasket are fixed by matching the inner sleeve of the case back with the groove of the caseband.

2. Lubrication

The following marks in the diagram indicate the types and quantities of oil to be applied and the lubricating points:

Types of Oil	Oil Quantity
 Silicon grease 500,000 c.s.	 Liberal quantity  Normal quantity  No lubrication

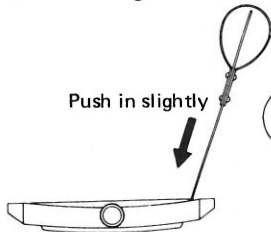
3. Disassembling and assembling



Note

• How to open the case

(1) Place the watch on a soft cloth. While holding the glass side down, the case back can be removed by pushing the case opener into the opening notch with the angle as shown in the illustration. Push the opener in gently so as not to damage the case.



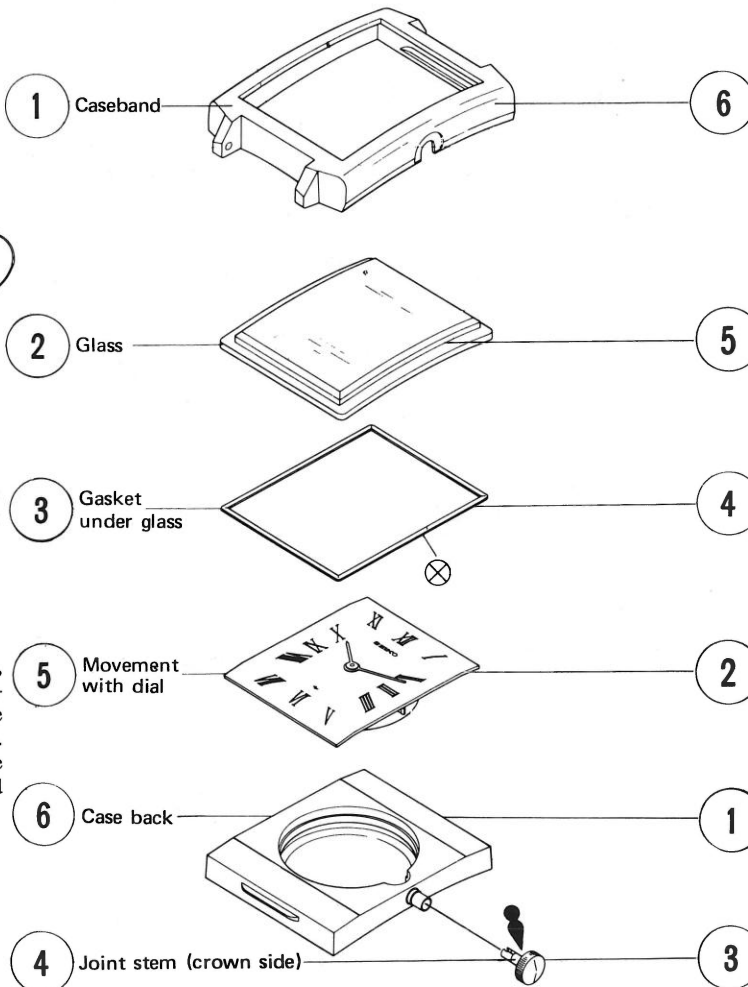
(2) The case back can now be removed by pushing it from the glass side.

Note

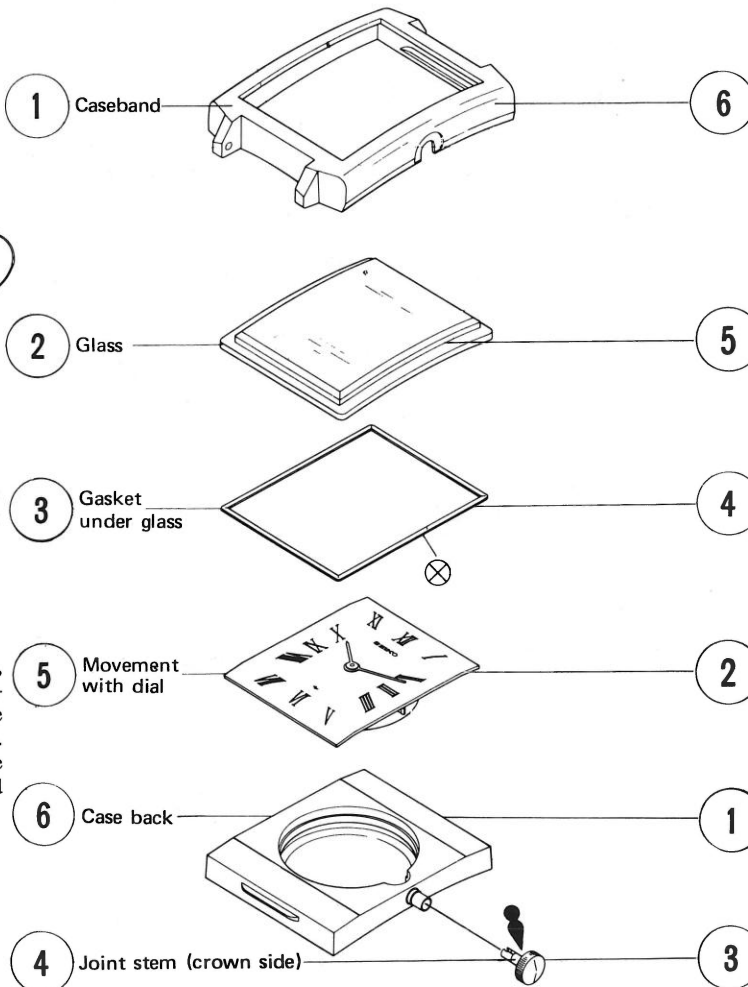
• How to remove the movement

Turn the watch upside down, turn the crown counter-clockwise slowly and remove the movement from the case back. Be careful not to let the movement fall on a hard surface.

Disassembling procedures



Assembling procedures



Note

After inserting the crown (with the joint stem) into the stem pipe, turn it counter-clockwise to a click, and then push the crown in.






Square-type-5

1. Construction of Glass Portion

The case back, glass, gasket under glass, bezel and dial ring are fixed by matching the leaf springs of the case back, which are located around the 6 o'clock and 12 o'clock positions, with the grooves of the caseband.

2. Lubricating

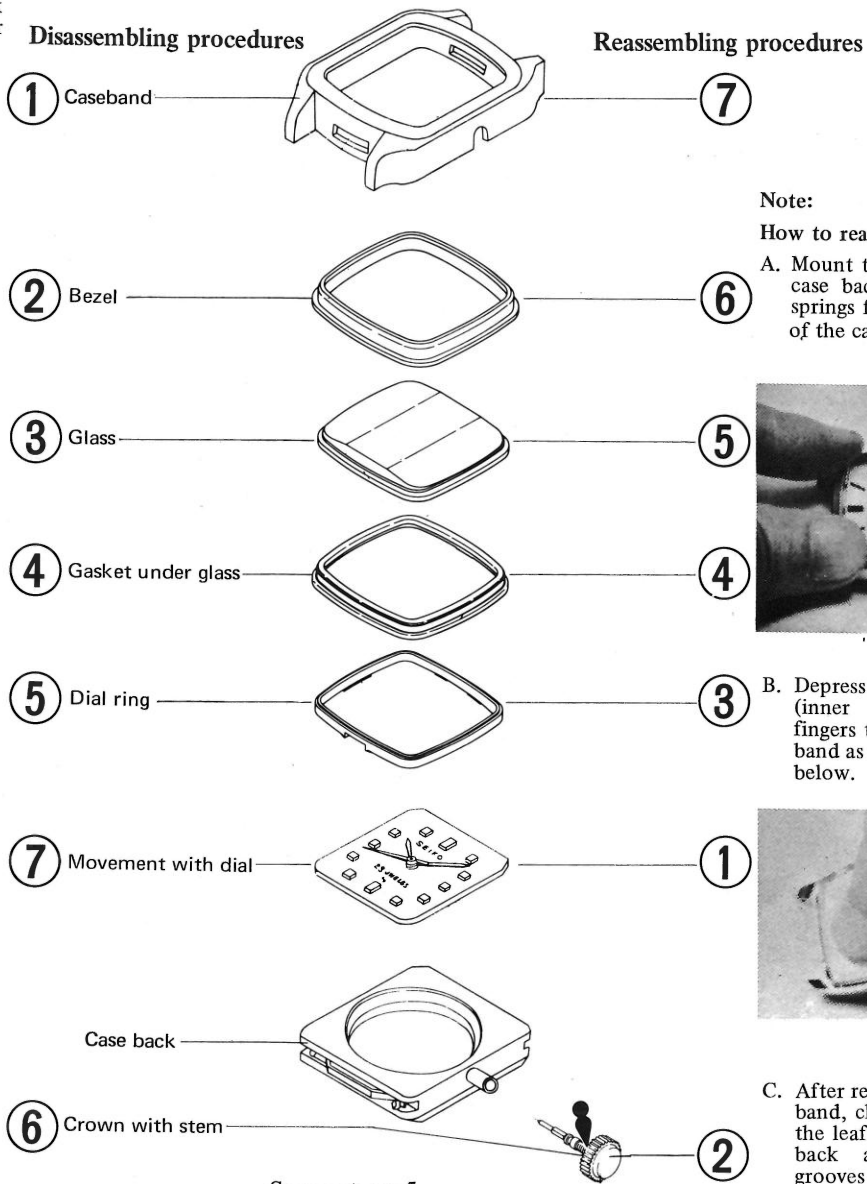
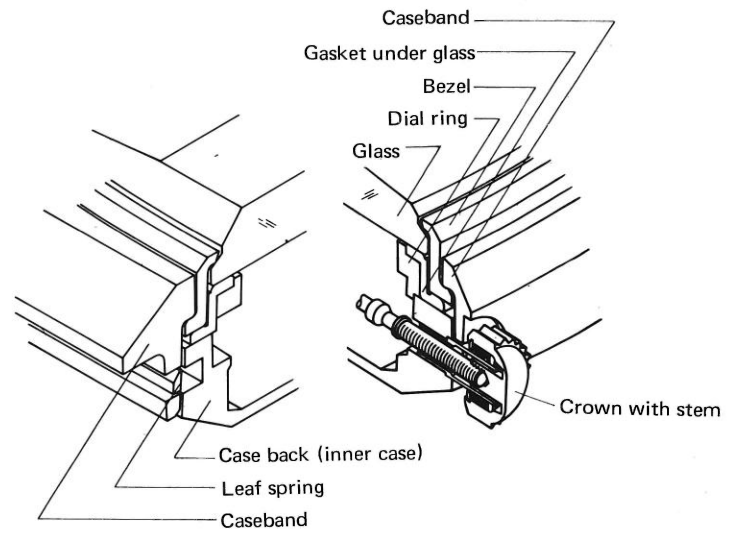
The following marks in the diagram indicate the type and quantities of oil to be applied and the lubricating portions.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity Never lubricate the portions marked 

3. Disassembling and reassembling

Note:

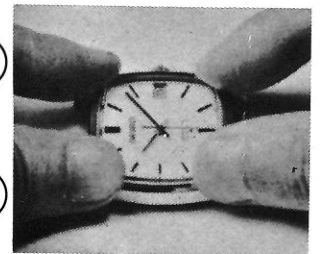
Remove the caseband by pushing the leaf spring located at the 6 o'clock and 12 o'clock positions with a screw driver or tweezers.



Note:

How to reassemble the caseband

A. Mount the caseband on the case back so that the leaf springs fix into the grooves of the caseband uniformly.



B. Depress the case back (inner case) hard with fingers to fix into the caseband as shown in the photo below.



C. After reassembling the caseband, check to be sure that the leaf springs of the case back are set into the grooves completely.




Square-type-6

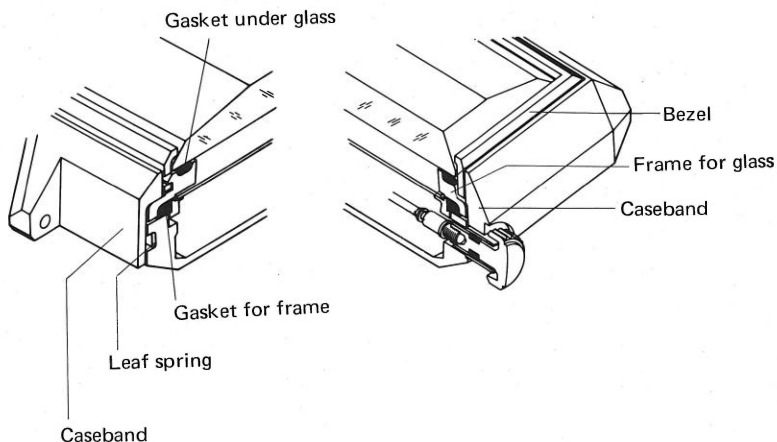
1. Construction of Glass Portion

By matching and pressing the four leaf springs of the case back into the four grooves of the caseband, the caseband and case back are fixed, and at the same time the glass (combined with glass, bezel and frame for glass) and the gasket for frame are fixed to the case back by the caseband.

2. Lubricating

The following marks indicate the type and quantities of oil to be applied and lubricating portions.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity Never lubricate the portions marked 

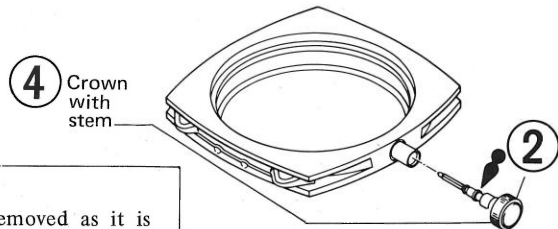
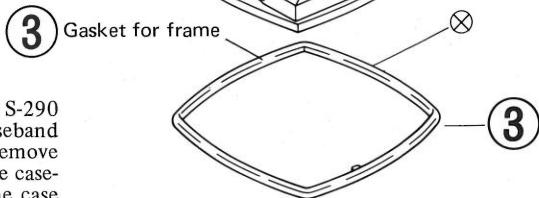
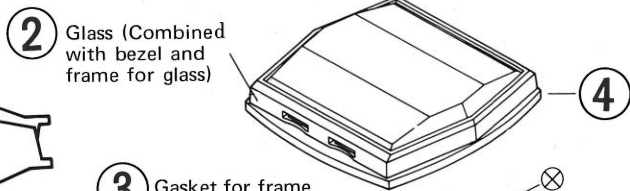
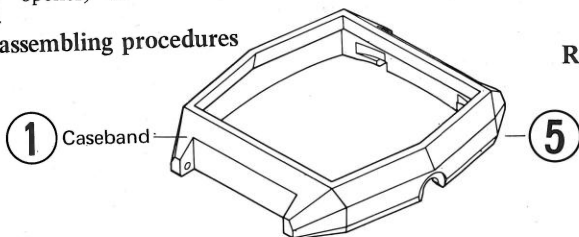


3. Disassembling and reassembling

Note:

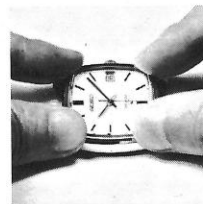
Remove the caseband from the case back with the opener S-290 (SEIKO square-t type water-resistant case opener) as shown in the photo below.

Disassembling procedures

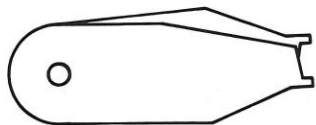


Reassembling procedures

A. Place the case back on the desk and mount the caseband on the case back. Push the four corners of the caseband evenly with fingers.

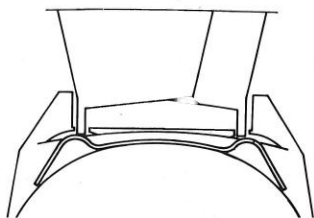


B. Push the case back hard with fingers so that the caseband is fixed to the case back firmly as shown in the photo.



Insert the tips of the opener S-290 into the two holes of the caseband and push the leaf springs to remove them from the grooves, and the caseband can be removed from the case back by pushing the opener with the angle as shown in the photo.

Remarks: Do not pry open with a case opener.



Note:

*1. The glass cannot be removed as it is combined with the bezel and the frame for glass. Do not pry open with a case opener.

Note:

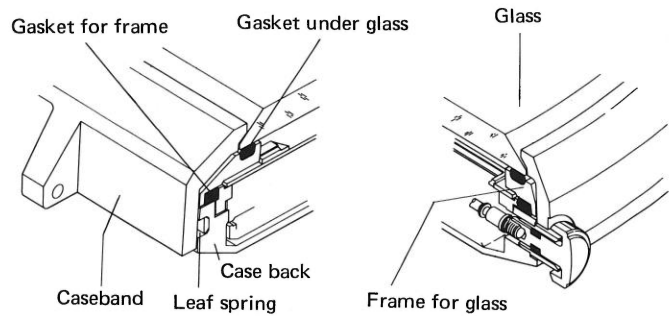
When reassembling, be careful that the gasket is not on the holding ring for dial or it is not out of the case.

Square-type-7

1. Construction

1-1 Construction of Glass Portion

By matching and pressing the four leaf springs of the case back into the four grooves of the caseband, the caseband and case back are fixed, and at the same time the case back, glass, gasket under glass, frame for glass and gasket for frame are fixed to the case back by the caseband.



2. Lubricating

The following marks indicate the type and quantities of oil to be applied and lubricating portions.

Type of oil	類	Oil quantity
◐	Silicon grease 500,000 c.s.	○ Normal quantity ⊗ Never lubricate the portions marked ⊗

3. Disassembling and reassembling

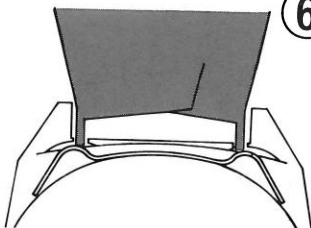
Note:

Remove the caseband from the case back with the opener S-290 (SEIKO square-type water-resistant case opener).

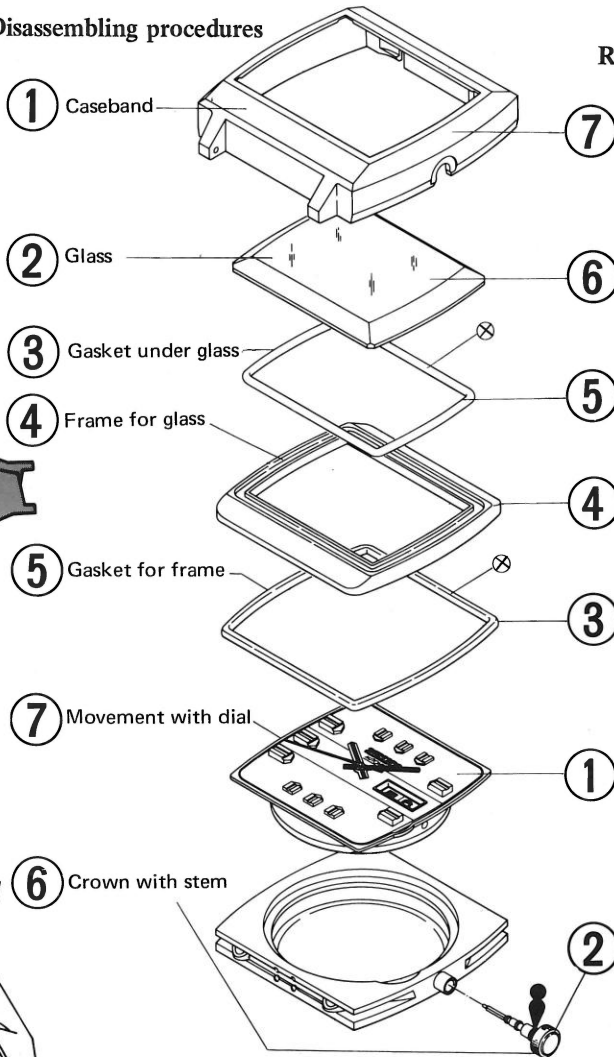


Insert the tips of the opener S-290 into the two holes of the caseband and push the leaf springs to remove them from the grooves, and the caseband can be removed from the case back by pushing the opener with the angle as shown in the photo.

Remarks: Do not pry open with a case opener.



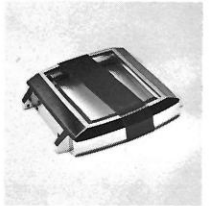
Disassembling procedures



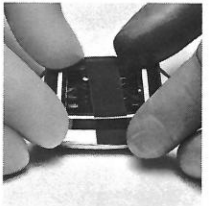
Reassembling procedures

In order to tighten the case, follow the procedures below.

A. Stick cellophane tape on the caseband (from the 3 o'clock position to the 9 o'clock position).



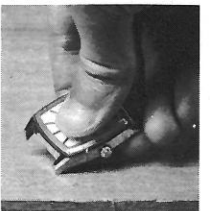
B. Place the glass from the inside of the caseband.



C. After reassembling the glass with the caseband, the caseband is placed on the case back, and push the four corners of the caseband evenly in order to fix it to the case back firmly.



D. Push the four corners of the glass with fingers so that the caseband is fixed to the case back firmly as shown in the photo.



Note:

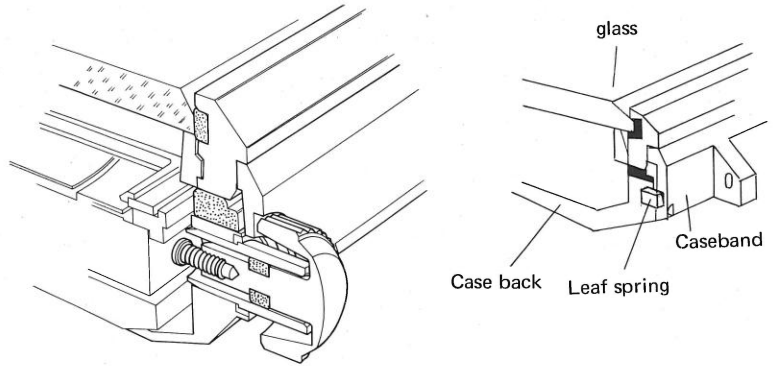
When reassembling, be careful that the gasket is not on the holding ring for dial or it is not out of the case.

After removing cellophane tape, clean the caseband and glass with a cloth moistened with alcohol.

Square-type-8

1. Construction of Glass Portion

The case back is set to the caseband by fixing the leaf springs of the case back into the grooves of the caseband. The glass is fixed by the fixing ring for glass and by the caseband, having the glass side gasket in the upper inside groove of the caseband.



2. Lubricating

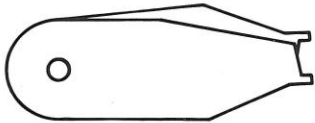
The following marks in the diagram indicate the type and quantities of oil to be applied and the lubricating portions.

Type of oil	Oil quantity
Silicon grease 500,000 c.s.	Normal quantity Small quantity Never lubricate the portions marked

3. Disassembling and reassembling

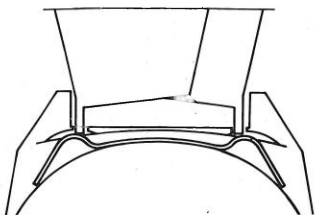
Note:

Remove the caseband from the case back with the opener S-290 (SEIKO square-type water-resistant case opener).

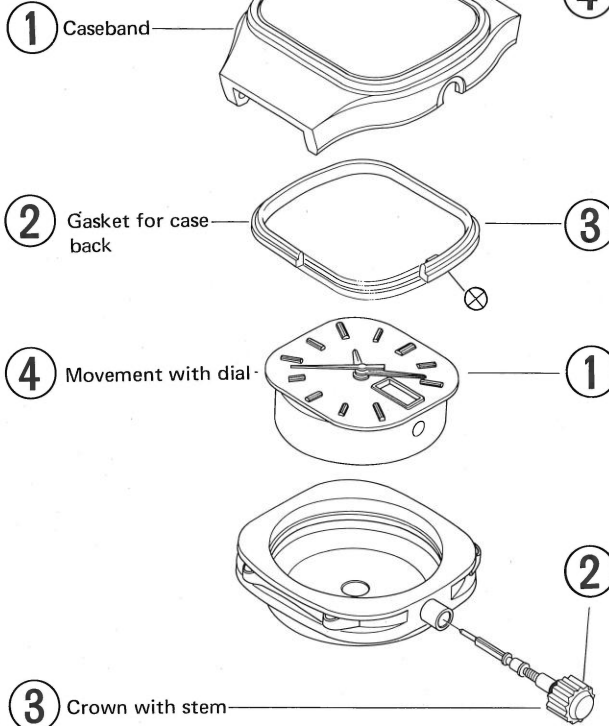


Insert the tips of opener S-290 into the two holes of the caseband and push the leaf springs to remove them from the grooves, and the caseband can be removed from the case back by pushing the opener with the angle as shown in the photo.

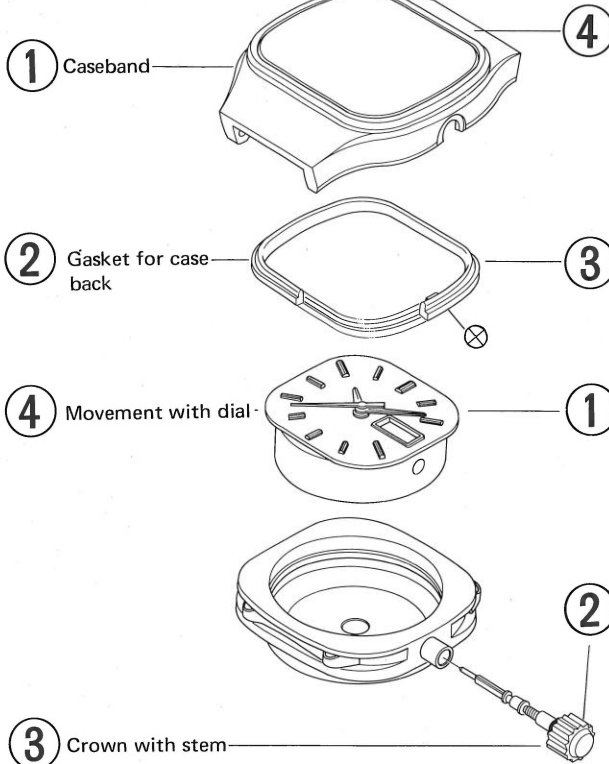
Remarks: Do not pry open with a case opener.



Disassembling procedures



Reassembling procedures



Disassembling and reassembling procedures of glass portion

Disassembling	Reassembling
(1) Fixing ring for glass (2) Glass (3) Gasket under glass Caseband	(3) Opening notch (2) (1) Do not remove the bezel
How to remove the glass: Pry up the fixing ring for glass with a screw driver toward the arrow-marked direction as shown in the illustration below, and the glass can be removed with fingers. Note: Be careful not to damage the fixing ring for glass.	
Note for reassembling: Be sure to replace the gasket under glass with a new one. The fixing ring for glass must be fixed firmly by pushing its four corners with a punch.	

Reassembling procedures of the caseband and the case back are the same as Square-type-1 and Square-type-7.




Square-type-9

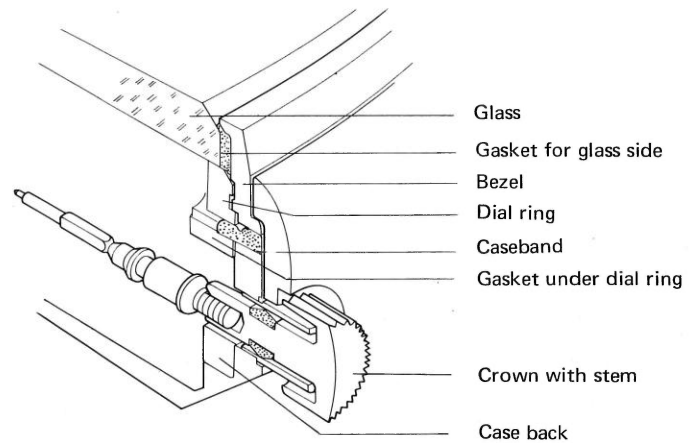
1. Construction of Glass Portion

The glass is fixed to the bezel with the gasket for glass side and is pushed up to the bezel with the dial ring which is fixed with the caseband.

2. Lubricating

The following marks in the diagram indicate the type and quantities of oil to be applied and the lubricating portions.

Type of oil	Oil quantity
 Silicon grease 500,000 c.s.	 Normal quantity
	Never lubricate the portions marked 



3. Disassembling and reassembling

How to remove the caseband

Remove the caseband while pushing the leaf spring located at the 6 o'clock and 12 o'clock position with a screw driver or a tweezers.

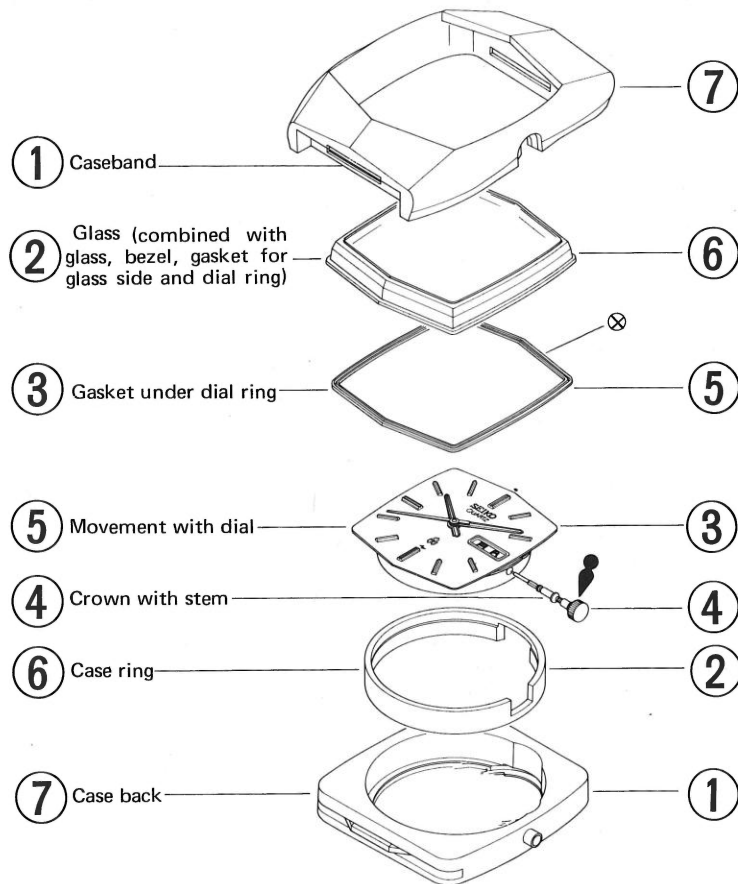
Remarks:

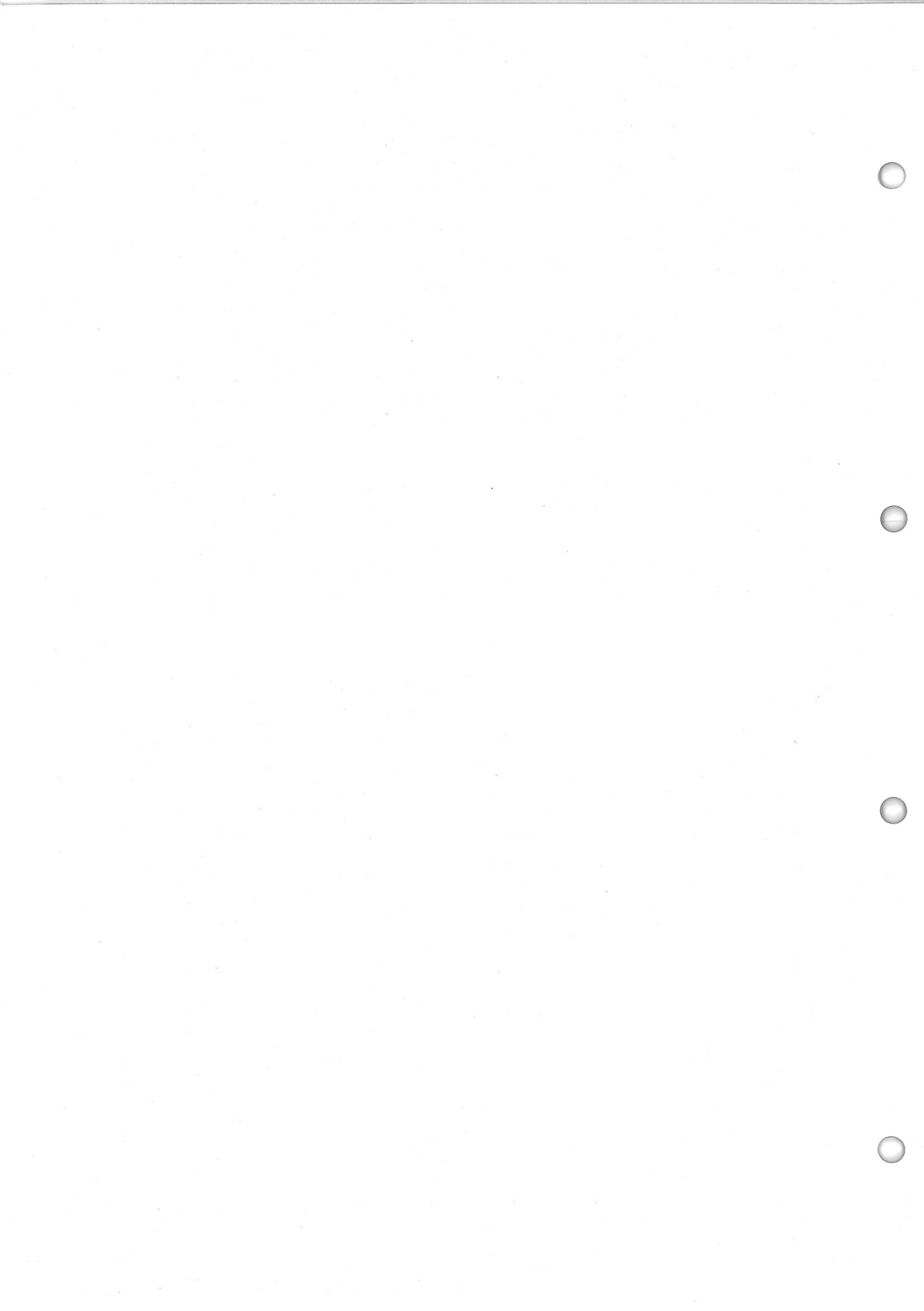
The glass portion is combined with the glass, bezel, gasket for glass side and dial ring.

When replacing the glass, be sure to replace the glass portion with new one.

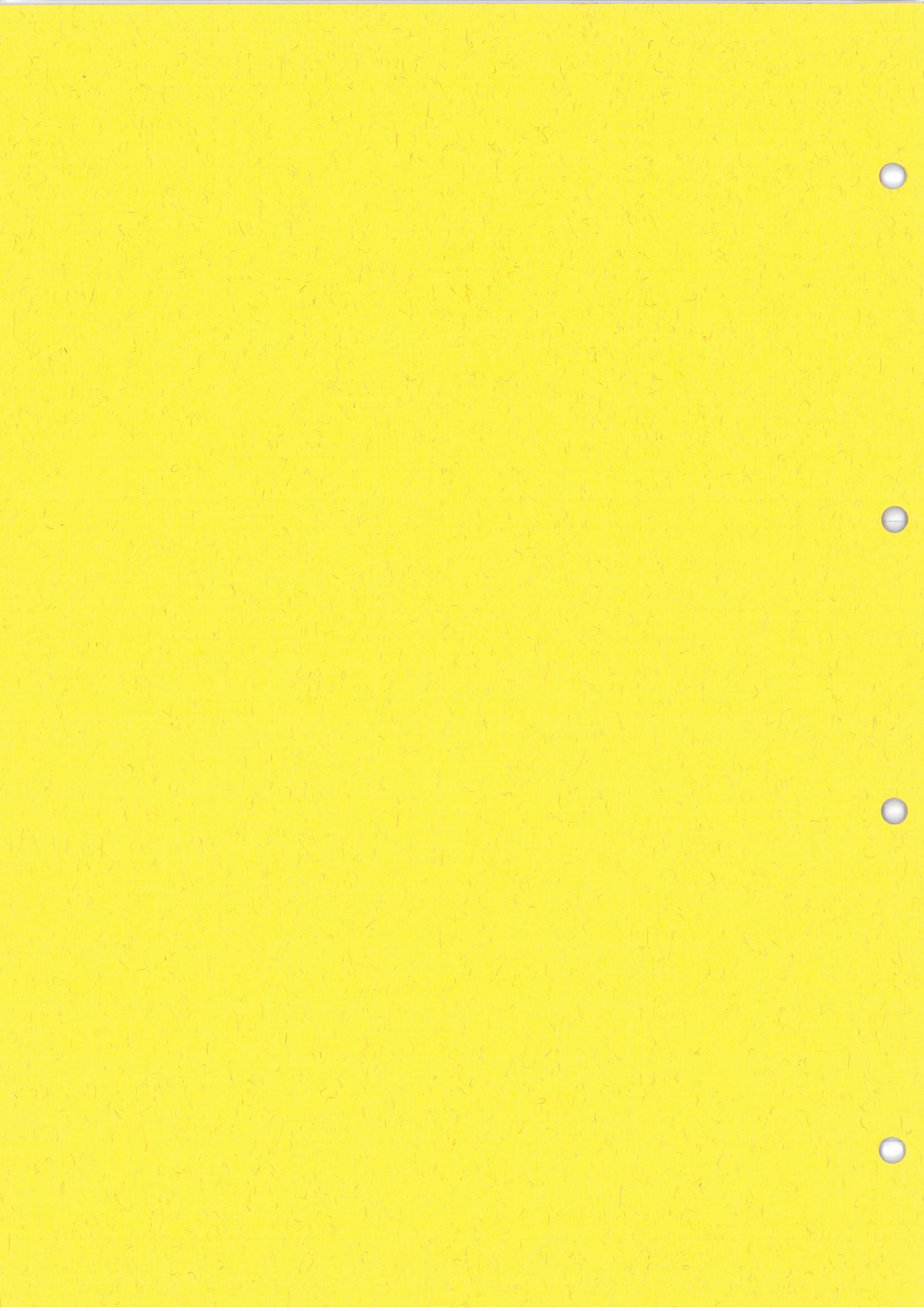
Disassembling procedures

Reassembling procedures





Explanation of representative calibres



List of Basic & Derivative Calibres in numerical order

Basic Cal.	Derivative Cal.	Basic Cal.	Derivative Cal.
1104A 17j	11A 17j	2406A 23j	2409A 23j
	11A 21j		2411A 23j
	1104A 21j		2415A 23j
	1120A 23j		2418A 23j
	1140A 23j		2419A 23j
	1144A 23j		2421A 23j
15A 21j	1520A 17j		2426A 23j
	1520B 17j		2466A 25j
	1520B 23j		2431A 25j
17A 20j	17A 17j		2435A 25j
	1719A 17j		2501A 17j
21A 17j	21C 17j		
	21D 17j	2505A 21j	
	2102A 17j	2505B 17j	
	2102C 17j	2505B 21j	
	2104A 17j	2565A 25j	
	2104B 17j	2519A 23j	2502A 17j
	2105A 21j		2502A 23j
	2107A 17j		2515B 17j
	2107A 21j		2516B 21j
	2107B 17j		2517A 17j
	2107B 21j		2517A 21j
	2107B 23j		2517B 17j
	2117A 17j		2517B 21j
	2118A 17j		2517B 21j
	2118A 21j		2518A 23j
	2118A 23j	2518B 17j	
	2119A 21j	2518B 21j	
2119B 21j	2518B 23j		
2140A 21j	2519B 23j		
2160A 17j	2539A 25j		
2202A 21j	2202A 17j	2559A 24j	
	2202A 23j	2706A 21j	
	2220A 17j	2706A 17j	
	2220A 24j	2906A 17j	
2205A 17j	2242A 23j	2906A 21j	
	2201A 17j	37A 16j	3702A 16j
	2205A 21j		3703B 16j
	2205A 25j	4006A 27j	4005A 27j
	2206A 17j		4006A 17j
2206A 23j	4006A 21j		
	2245A 25j		

List of Basic & Derivative Calibres in numerical order

Basic Cal.

Derivative Cal.

5206A 23j — { 5206A 25j
5216A 23j
5216A 25j
5245A 25j
5246A 25j
5256A 25j

5606A 23,25j — { 5601A 23j
5605A 25j
5619A 23j
5621A 25j
5621B 25j
5625A 25j
5625B 25j
5626A 25j
5626B 25j

5645A 25j — { 5641A 25j
5646A 25j

5740C 23j

61A 21j — { 61A 17j
6102A 17j
6102A 21j
6110A 21j

6106A 25j — { 6105A 17j
6105B 17j
6106B 17j
6106B 25j
6106C 17j
6106C 23j
6106C 25j
6109A 17j
6117A 17j
6117B 17j
6118A 17j
6119A 21j
6119B 21j
6119C 21j
6138A 21j
6138B 21j
6138B 23j
6139A 17j
6139A 21j
6139B 17j
6139B 21j

Basic Cal.

Derivative Cal.

6146A 25j — { 6145A 25j
6155A 25j
6156A 25j
6159A 25j
6159B 25j

63A 17j — 6302A 17j

6309A 17j — { 6306A 21j
6308A 17j
6319A 21j

66B 17j — { 66A 17j
6602B 17j
6618A 17j
6660A 21j

6601B 17j — { 6601A 17j
6606B 21j
6619A 21j

7005A 17j — { 7001A 17j
7006A 17j
7006A 19j
7006A 21j
7015A 21j
7016A 17j
7017A 21j
7018A 23j
7018B 23j
7019A 21j
7009A 17j
7025A 17j
7039A 21j

8800D 7j — { 8800A 7j
8800B 7j
8800C 7j
8800E 7j
8800F 7j

1100A

1) Specifications

Casing diameter	15.15mm x 13.00mm
Height	3.66mm
Vibrations per hour	21,600 (6 beats per second)

2) Features

The 1100 is a new calibre designed to offer excellent time accuracy and stability over a long period as a lady's wrist watch. The movement is based on the 1104, and the principal features are as follows:

1. The stability of the movement is raised by increasing the moment of inertia of the balance to an extent incomparable with any other movements of this class.
2. The escapement is designed small and lightweight to minimize watch gain or loss due to escapement errors.
3. The train wheel is designed large enough to the space limit to minimize difference of watch posture when it is worn on the wrist.

3) Disassembly and assembly

Disassemble the watch according to Figs. (1) - (37).

Assemble by reversing the above order: Figs. (37) - (1)

4) Lubrication

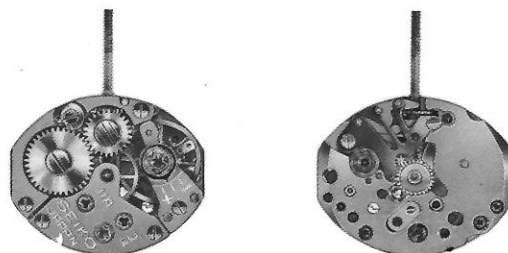
Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and the lubricating points.

Types of oil

- ▶ Moebius Synt-A-Lube
- ▶ Seiko Watch Oil S-4

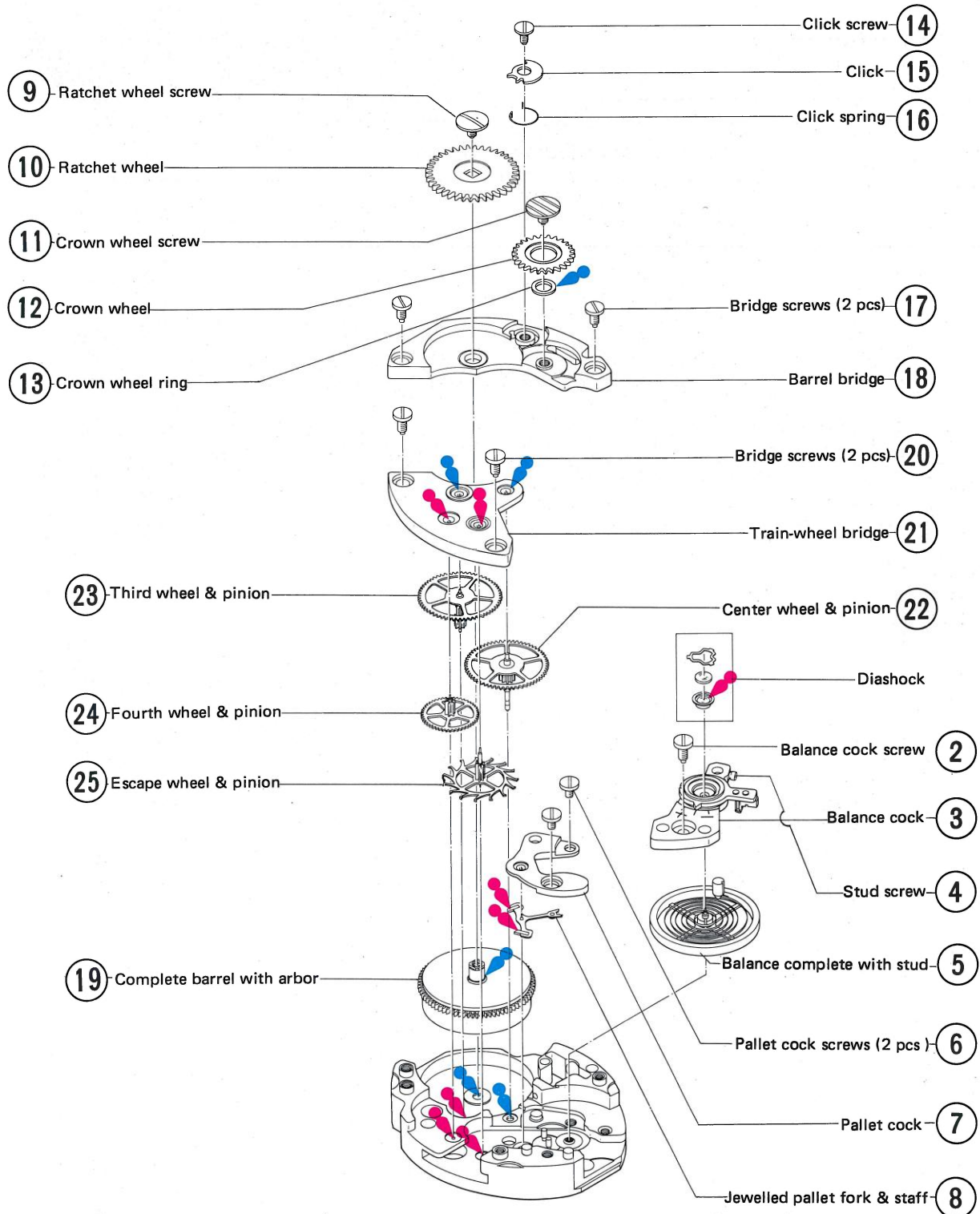
Oil quantity

- ▶ Sufficient quantity
- ▶ Normal quantity
- ▶ Extremely small quantity

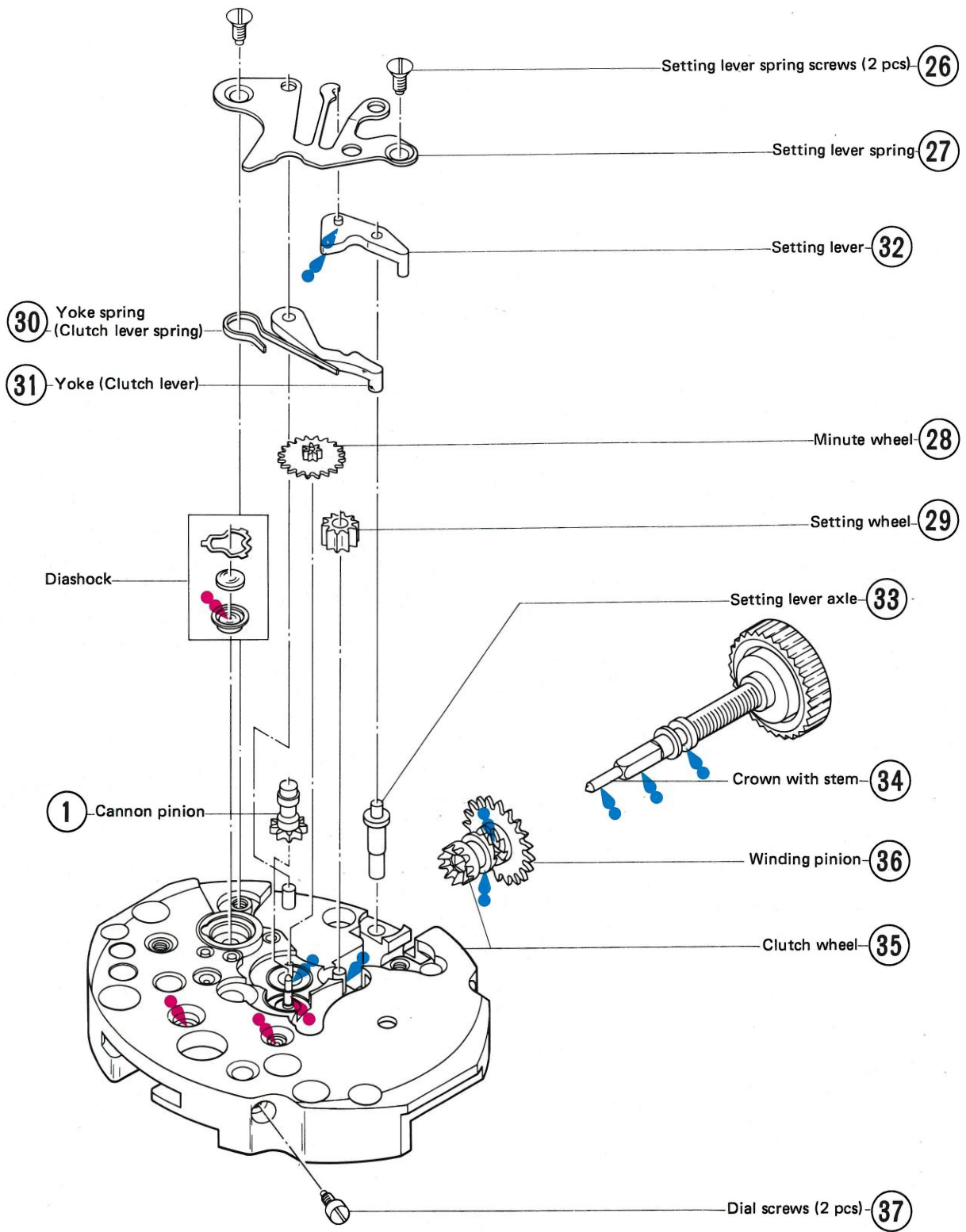


Movement

1100A Train Wheel



1100A Setting Mechanism





1104A (Seiko Salvia)

1) Specifications

Casing diameter	13.00 × 15.15mm
Height	4.30mm
Vibrations per hour	21,600
Indirect center second system movable stud holder (for correcting out-of-beat)	

2) Structure of casing parts

Either of the following two constructions is provided on the case.

2)-1 Case provided with dustproof pipe (Fig. 1)

A dustproof pipe is installed to prevent dust, shag, and so on from entering the crown portion.

2)-2 Case provided with dustproof plate ring (Fig. 2)

A plate ring having dustproof gasket and a dustproof plug is employed to completely guard the movement from the entry of dust, shag, and so on.

2)-3 Regular type case

3) Structure of movement

The following special features apply to the movement structure.

3)-1 Gear train and Mainspring

The conventional two-wheel type third wheel of the indirect center second has been improved to one wheel, and the size of the barrel has been enlarged, permitting the use of a mainspring with extended durability and large torque.

Transmission of force:

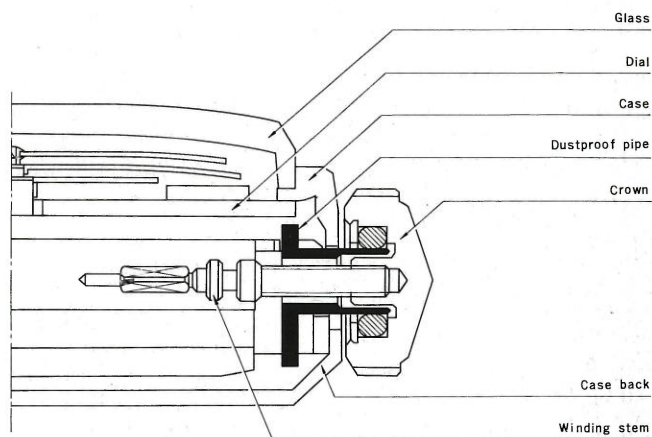
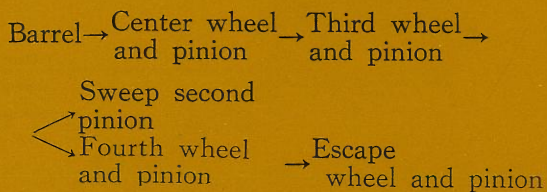


Fig. 1

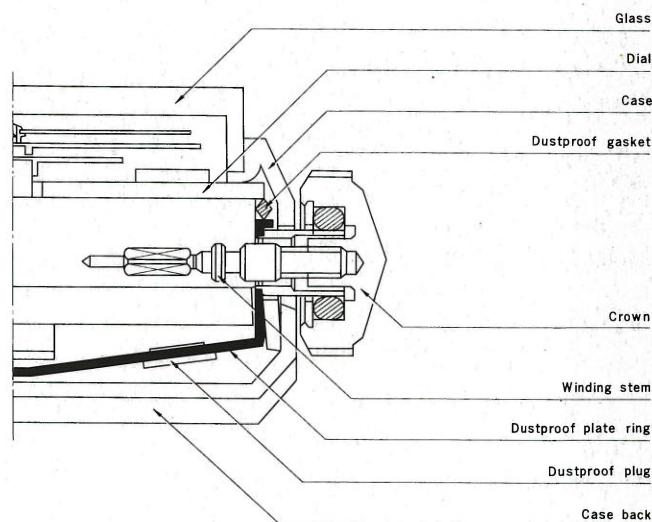


Fig. 2

3)-2 Escapement

To raise efficiency of the escapement, the parts are light weight and small sized, and a bridge type pallet cock is adopted for stabilization of the escapement.

3)-3 Balance complete

A balance having a large moment of inertia is adopted to ensure high precision and stabilization. Vibration of the balance is 21,600 times per hour (6 vibrations per second).

4) Basic movement (Fig. 3, 4)

5) Disassembly and Assembly

See p: 1104A-3~p.1104A-8

6) Checking

1. Space between hands
2. Revolve the crown
3. Rotation of the hands
4. Winding
5. Position of hour and minute hands (at 12 o'clock)
6. Smoothness of second hand rotation

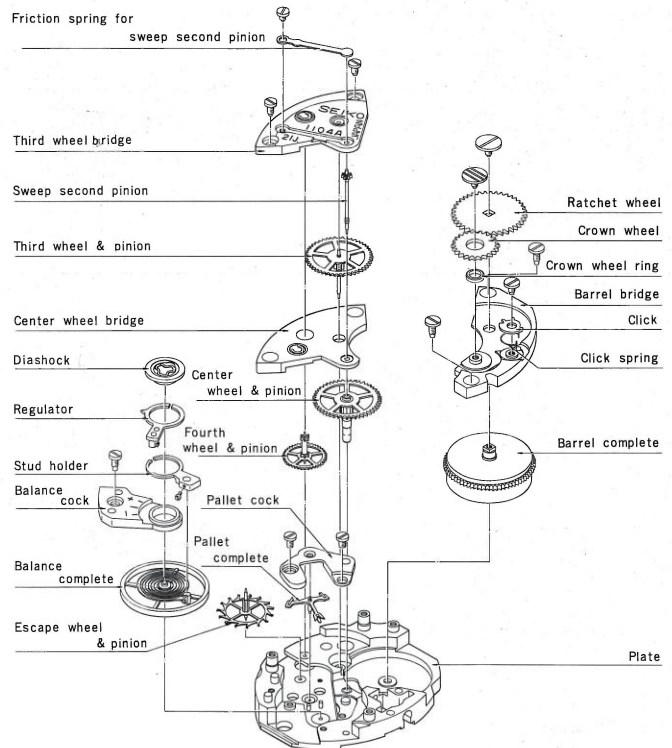


Fig. 3

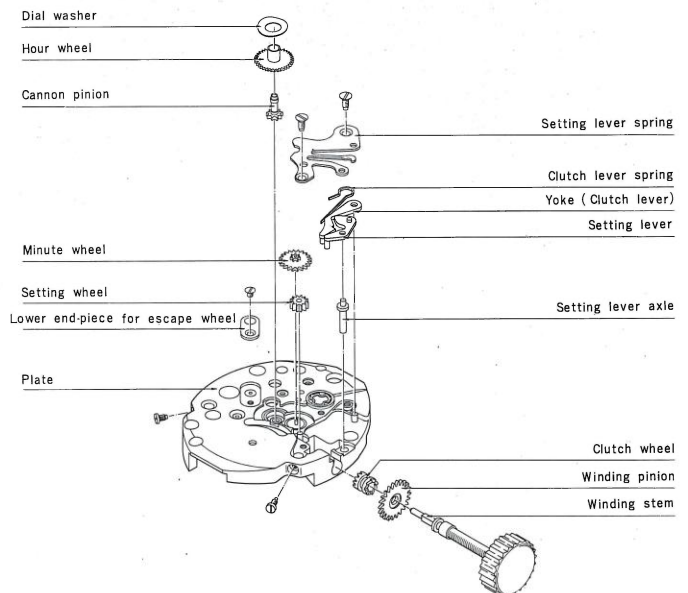
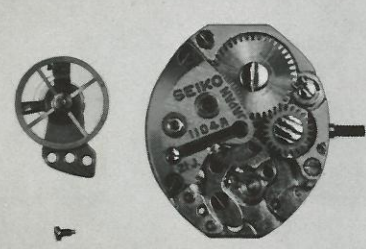
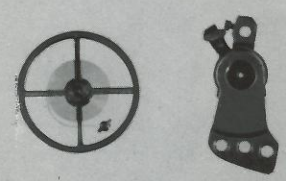
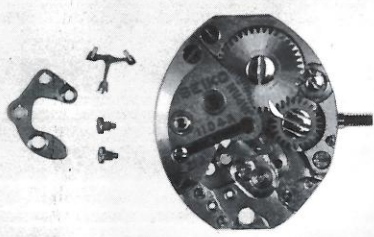
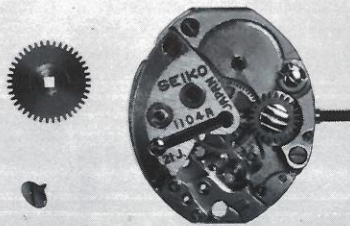
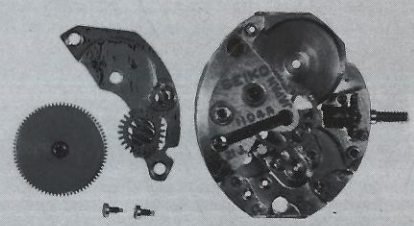


Fig. 4

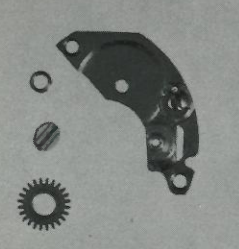
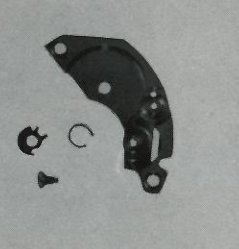
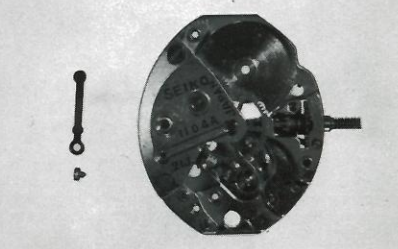
1104A Disassembly and assembly—continued

Disassembly	1	BALANCE COCK	2	BALANCE	3	UNWINDING OF MAINSPRING
	<ol style="list-style-type: none"> 1) Remove balance cock screw 2) Remove balance cock 		<ol style="list-style-type: none"> 1) Turn regulator key with screwdriver and then remove spring 2) Loosen stud screw 3) Remove stud from balance cock 		<p>Disengage click and ratchet wheel from gearing with tweezers, and slowly unwind the spring</p>	
	<p>Be careful not to bend hair spring</p>					
Photo						
Assembly	18	BALANCE COCK	17	BALANCE	16	ROTATION OF HANDS
	<ol style="list-style-type: none"> 1) Set balance cock with balance 2) Fasten balance cock screw 3) Check proper end shake of balance 		<ol style="list-style-type: none"> 1) Set balance on balance cock 2) Turn regulator key, so that hair spring is held 3) Fasten stud screw, so that stud head is kept above balance cock (in proper position) 		<ol style="list-style-type: none"> 1) Check the rotation of hands 2) Check end shake of pallet 	
Remark			<p>Carefully check centering of hair spring</p>			

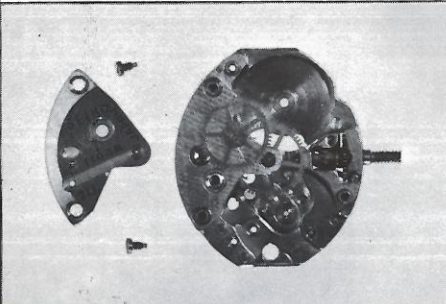
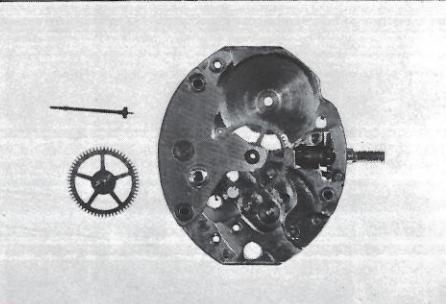
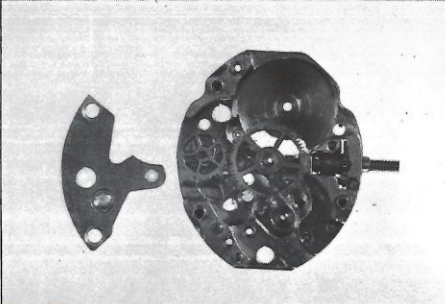
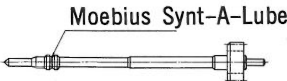
1104A Disassembly and assembly—continued

	4	5	6
Disassembly	PALLET	RATCHET WHEEL	BARREL COMPLETE WITH ARBOR
	<ol style="list-style-type: none"> 1) Remove pallet cock screws (2 pcs) 2) Remove pallet cock 3) Remove pallet 	<ol style="list-style-type: none"> 1) Remove ratchet wheel screw 2) Remove ratchet wheel 	<ol style="list-style-type: none"> 1) Remove barrel bridge screws (2 pcs) 2) Remove barrel complete with arbor
			<p>As barrel is removed, be careful not to touch center wheel, and third wheel.</p>
Photo			
Assembly	15	14	13
	PALLET	RATCHET WHEEL	BARREL COMPLETE
	<ol style="list-style-type: none"> 1) Lubricate pallet jewels (Moebius Synt-A-Lube) 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screws (2 pcs) 	<ol style="list-style-type: none"> 1) Set ratchet wheel 2) Fasten ratchet wheel screw 3) Check revolving condition of train wheels 	<ol style="list-style-type: none"> 1) Lubricate upper and lower pivots of barrel complete with arbor (watch oil S-4 or Moebius grease "Remontoires") 2) Set barrel complete with arbor 3) Set barrel bridge 4) Fasten barrel bridge screws (2 pcs)
Remark	<p>Check that pallet pivots has been put in jewel holes, and then fasten bridge screw.</p>		

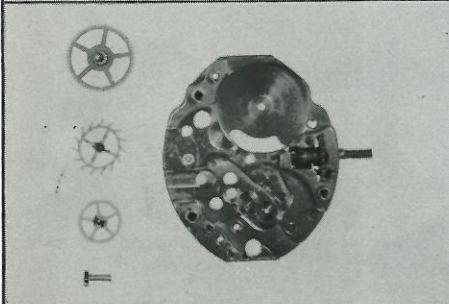
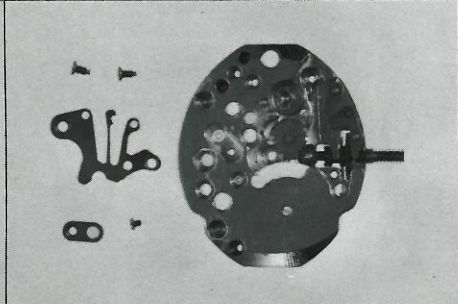
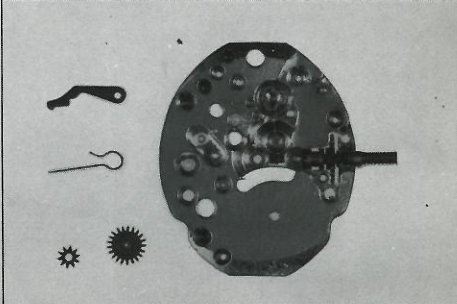
1104A Disassembly and assembly—continued

	7	8	9
Disassembly	CROWN WHEEL	CLICK AND CLICK SPRING	FRICTION SPRING FOR SWEEP SECOND PINION
Method	<ol style="list-style-type: none"> 1) Remove crown wheel screw 2) Remove crown wheel 3) Remove crown wheel ring 	<ol style="list-style-type: none"> 1) Remove click screw 2) Remove click 3) Remove click spring 	<ol style="list-style-type: none"> 1) Remove friction spring screw for sweep second pinion 2) Remove friction spring for sweep second pinion
Remark	Note that only crown wheel screw is left-threaded.		Be careful not to deform friction spring for sweep second pinion.
Photo			
Assembly	12	11	10
Method	<ol style="list-style-type: none"> 1) Set crown wheel ring on the barrel bridge 2) Lubricate side of crown wheel ring (watch oil S-4 or Moebius grease "Remontoires") 3) Set crown wheel 4) Fasten crown wheel screw 	<ol style="list-style-type: none"> 1) Set click spring to the barrel bridge 2) Set click to the barrel bridge 3) Fasten click screw 	<ol style="list-style-type: none"> 1) Lubricate lower pivot of center wheel and pinion (watch oil S-4 or Moebius grease "Remontoires") 2) Set cannon pinion
Remark	Note : Three grooved screw means left thread screw.	Be careful that the click spring does not leap off	

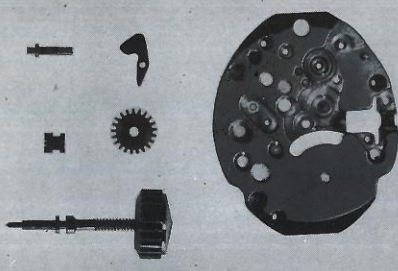
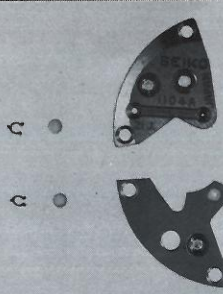
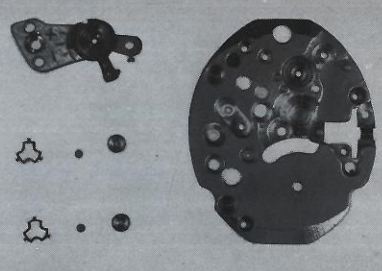
1104A Disassembly and assembly—continued

	10 THIRD WHEEL BRIDGE	11 SWEEP SECOND PINION THIRD WHEEL AND PINION	12 CENTER WHEEL BRIDGE
Disassembly	<p>Method</p> <ol style="list-style-type: none"> 1) Remove third wheel bridge screws (2 pcs) 2) Remove third wheel bridge 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove sweep second pinion 2) Remove third wheel and pinion 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove center wheel bridge
Remark			
Photo			
Assembly	<p>Method</p> <ol style="list-style-type: none"> 1) Set third wheel bridge and screws (2 pcs) 2) Make sure that train wheels rotate smoothly and check end shake of each wheel and pinion 3) Lubricate upper pivot of third wheel and pinion (watch oil S-4) 4) Lubricate upper pivot of sweep second pinion (Moebius Synt-A-Lube) 5) Set friction spring for sweep second pinion and fasten screw 	<p>Method</p> <ol style="list-style-type: none"> 1) Set third wheel 2) Lubricate sweep second pinion and set it 	<p>Method</p> <ol style="list-style-type: none"> 1) Lubricate upper pivot of center wheel and pinion (watch oil S-4 or Moebius grease "Remontoires") 2) Set center wheel bridge
Remark	<p>Since its construction is purposely thin, pay attention to the friction spring for sweep second pinion to prevent warping, bending, breaking, and so on. Correctly install the friction spring for sweep second pinion on the recessed part of third wheel bridge; rounded center portion should be on the bottom of the recess.</p>		
		 <p style="text-align: center;">Moebius Synt-A-Lube</p>	

1104A Disassembly and assembly—continued

	13	14	15
Disassembly	CENTER WHEEL AND PINION FOURTH WHEEL AND PINION	SETTING LEVER SPRING	MINUTE WHEEL, SETTING WHEEL AND CLUTCH LEVER
Method	<ol style="list-style-type: none"> 1) Remove fourth wheel and pinion 2) Remove cannon pinion 3) Remove center wheel and pinion 	<ol style="list-style-type: none"> 1) Remove screws for setting lever spring (2 pcs) 2) Remove setting lever spring 3) Remove lower end-piece screw for escape wheel 4) Remove lower end-piece for escape wheel 	<ol style="list-style-type: none"> 1) Remove minute wheel 2) Remove setting wheel 3) Remove clutch lever spring 4) Remove clutch lever
Remark	Take out the cannon pinion vertically.		
Photo			
Assembly	6	5	4
Method	CENTER WHEEL AND PINION, FOURTH WHEEL AND PINION & ESCAPE WHEEL AND PINION	SETTING LEVER SPRING	MINUTE WHEEL, SETTING WHEEL AND CLUTCH LEVER
Remark	<ol style="list-style-type: none"> 1) Lubricate center lower jewel (watch oil S-4) 2) Set center wheel and pinion 3) Lubricate lower end-piece for escape wheel, and lower hole jewel of fourth wheel 4) Lubricate lower hole jewel of third wheel (watch oil S-4) 5) Set escape wheel, fourth wheel 	<ol style="list-style-type: none"> 1) Set setting lever spring and fasten screws (2 pcs) 2) Set lower end-piece for escape wheel and fasten screw 	<ol style="list-style-type: none"> 1) Set clutch lever and its spring 2) Lubricate minute wheel pivot, and setting wheel pin (watch oil S-4) 3) Set setting wheel and minute wheel.
Remark		First fasten the screw on side of winding wheel.	

1104A Disassembly and assembly—continued

	16	17	18
Disassembly	WINDING STEM	DIAFIX	DIASHOCK
Method	<ol style="list-style-type: none"> 1) Remove setting lever 2) Remove setting lever axle 3) Remove winding stem 4) Remove clutch wheel, winding pinion 	<ol style="list-style-type: none"> 1) Remove Diafix spring 2) Remove cap jewel 	<ol style="list-style-type: none"> 1) Remove Diashock springs 2) Remove cap jewel 3) Remove hole jewel with frame
Remark			
Photo			
Assembly	3	2	1
Method	<ol style="list-style-type: none"> 1) Set winding pinion, clutch wheel 2) Lubricate winding stem and set it 3) Set setting lever axle, setting lever 4) Lubricate winding pinion and clutch wheel 5) Lubricate setting lever end, setting lever dowel 	<ol style="list-style-type: none"> 1) Set Diafix cap jewel in center wheel bridge and third wheel bridge 2) Set spring 3) Lubricate it from the other side 4) Extent of lubrication : (Moebius Synt-A-Lube) Dia. of cap jewels Max. 1/2 Min. 1/3 	<ol style="list-style-type: none"> 1) Place cap jewel with flat surface upward 2) Put drop of oil on its center, holding cap jewel with tweezers 3) Set Diashock hole jewel with frame directly over oiled cap jewel (Moebius Synt-A-Lube) Dia. of hole jewel Max. 1/2 Min. 1/3 4) Set Diashock frames in the plate and balance cock 5) Set Diashock spring
Remark	Lubricate them watch oil S-4 or Moebius grease "Remontoires".		

17 A

1) Specifications

Casing diameter	13.50mm
Height	3.20mm
Vibrations per hour	21,600
Movable stud holder (for correcting out-of-beat)	

2) Features

By adopting a special train wheel which effectively utilizes a narrow space, a large barrel and a balance are built in. Therefore, in spite of its very small size, it offers stabilized performance, comparable to larger models. Since winding hairspring direction has been improved to be wound to the left, a posture difference of the watch movement which generates while worn on the wrist is reduced.

Adoption of a bridge-type-balance cock and pallet cock, considered rather difficult to integrate in small watches, raises accuracy of the escapement and governor mechanism.

To maintain an excellent running condition of this small-scaled, highly accurate lady's watch, a dustproof intermediate case is provided inside the two-piece case.

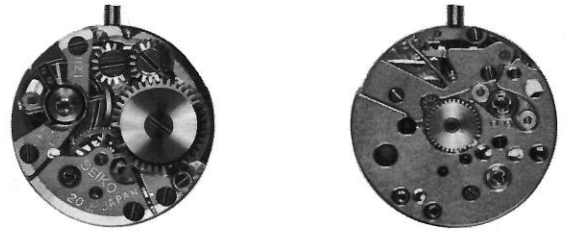
3) Disassembly and assembly

Disassemble the watch according to Figs.

① - ④⑧ .

Assemble by reversing the above by Figs.

④⑧ - ① .



Enlarged movement

4) Lubrication

Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and lubricating points.

Types

- ▶ Moebius Synt-A-Lube
- ▶ Seiko watch oil S-4

Oil quantity

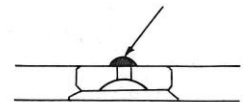
- ▶ Sufficient quantity
- ▶ Normal quantity
- ▶ Extremely small quantity

Note:

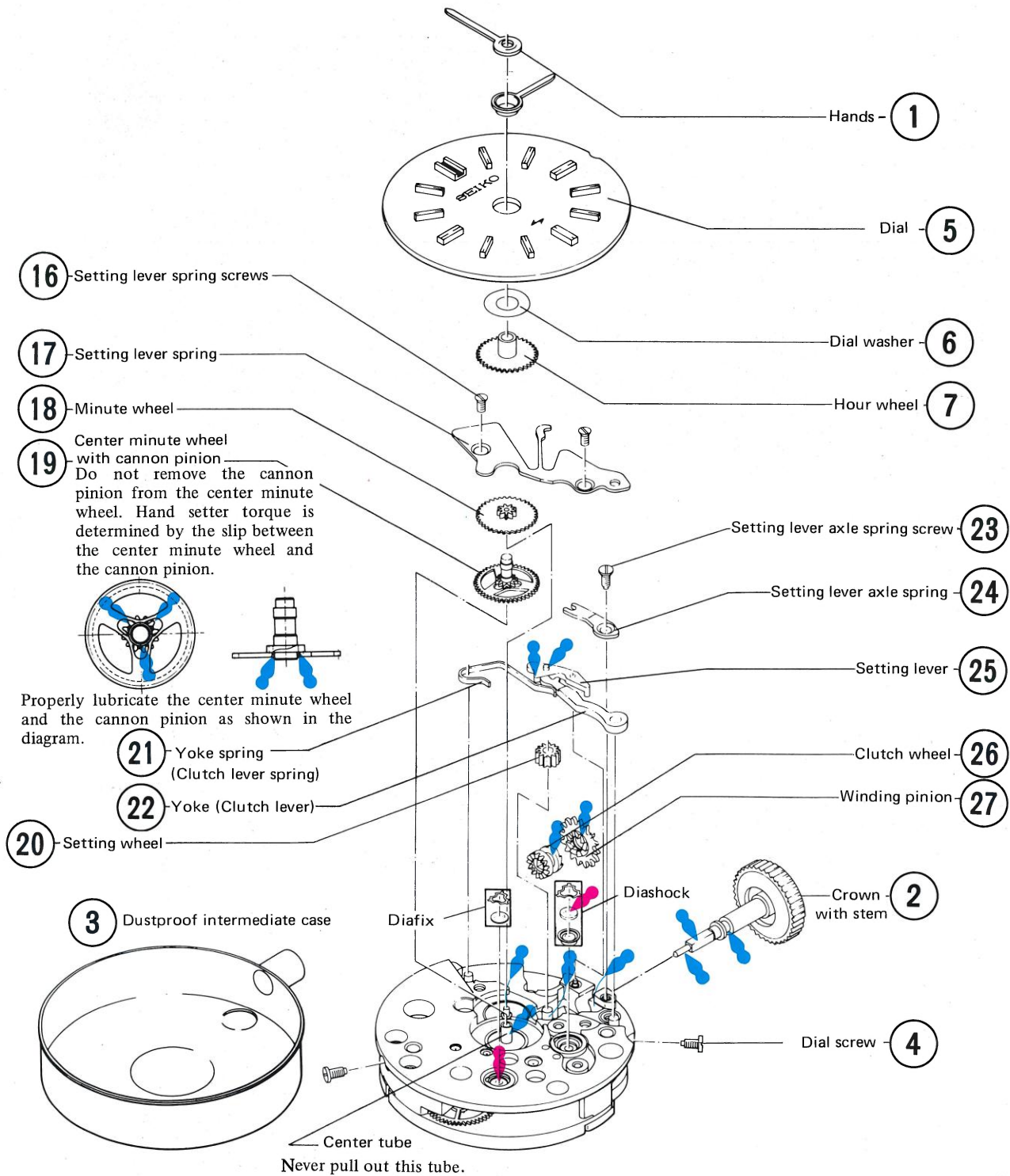
Refrain from lubricating points not so indicated.

Lubrication of SEIKO Watch Oil S-4

Lubricate the pivot holes of the front train wheel such as the plates, bridges etc. with SEIKO Watch Oil S-4 on the side in which the pivots are inserted as shown in the diagram.

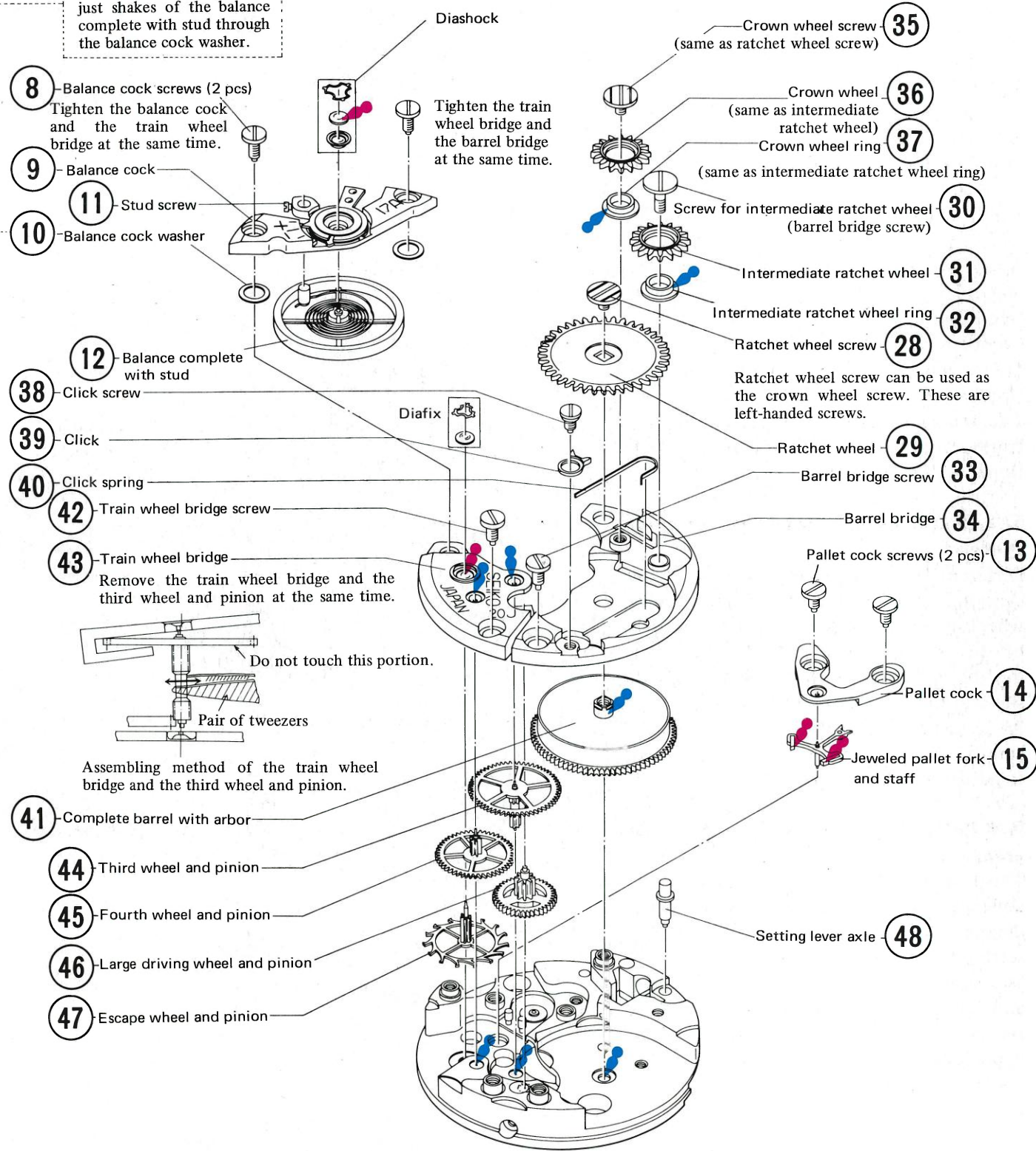


17 A Setting Mechanism



17 A Train Wheel, Escapement and Governor Mechanism

Since the balance cock, train wheel bridge, and barrel bridge are stacked, adjust shakes of the balance complete with stud through the balance cock washer.



5) Construction

5.-1 *Special train wheel*

By adopting a new, special train wheel, the 17 QUEEN SEIKO has a very large barrel and balance; consequently, the large driving wheel and pinion is located eccentrically from the center of the movement. The cannon pinion (to which the minute hand is inserted) is attached to the center minute wheel, and the center minute wheel is assembled to the center tube which is set on the rear surface of the plate. Consequently, the process of power transmission is as follows:

Complete barrel with arbor → Large driving wheel → Center minute wheel → Hour wheel

The process of power transmission for the front train wheel is the same as a conventional system. (Fig. 1)

5.-2 *Center minute wheel with cannon pinion*

Different from a conventional system, the cannon pinion is set to the toothed minute wheel by elastic portions of three supports of the toothed minute wheel. When turning the hands, these three elastic portions slip and the cannon pinion is turned.

As a result, slipping torque is extremely stabilized so that it becomes unnecessary to adjust the torque. (Fig. 2)

5.-3 *Pull-out mechanism for crown with stem*

This is a substitutional mechanism for the conventional joint stem. As shown in the diagram, when depressing tail A of the setting lever, the B portion is raised with C as a supporting point and permit attaching and detaching the crown with stem. Also the crown with stem can be detached by depressing the setting lever axle from the case back. (Fig. 3)

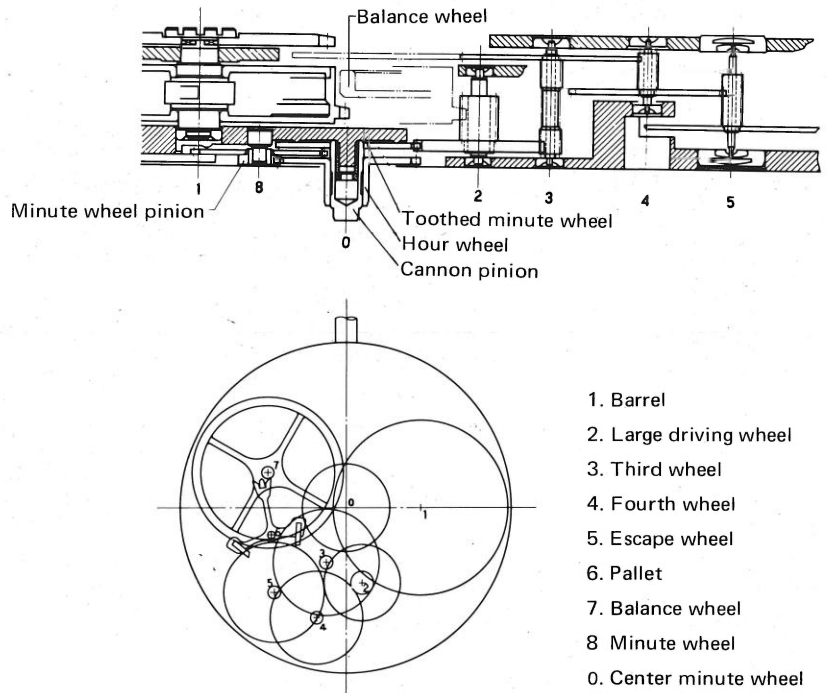


Fig. 1

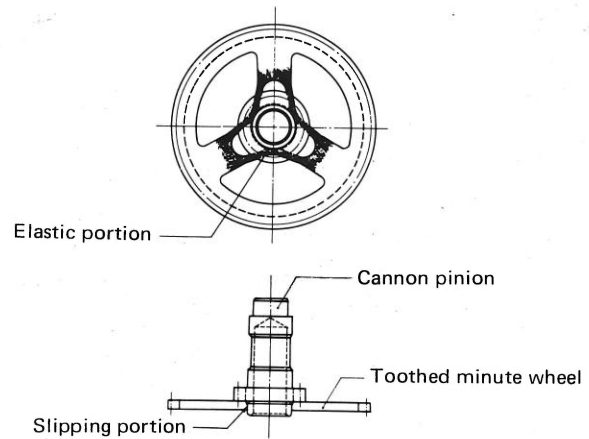


Fig. 2

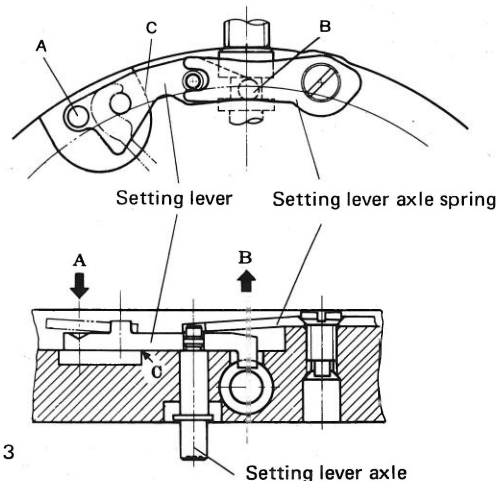


Fig. 3

2202A

1) Specifications

Casing diameter	17.20mm
Height	3.80mm
Vibrations per hour	28,800
Calendar (date) with instant date setting mechanism (Pull out type)	

2) Features

Since this movement is designed considering ease in disassembling and assembling operations and also functional stability, the numbers of parts are reduced and a high vibration mechanism of 8 beats per second is adopted.

To enhance watch quality, a light-weight, small pallet and bridge type pallet cock are employed. The space arounds the balance is increased to reduce the air resistance of the balance.

3) Disassembly and assembly

Disassemble the watch according to Figs. ①-⑤⑥

Assemble by reversing the above order: Figs. ⑤⑥-①

4) Lubrication

Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and the lubricating points.

Types of oil

▶ Moebius Synt-A-Lube

▶ Seiko Watch Oil S-4

Oil quantity

●▶ Sufficient quantity

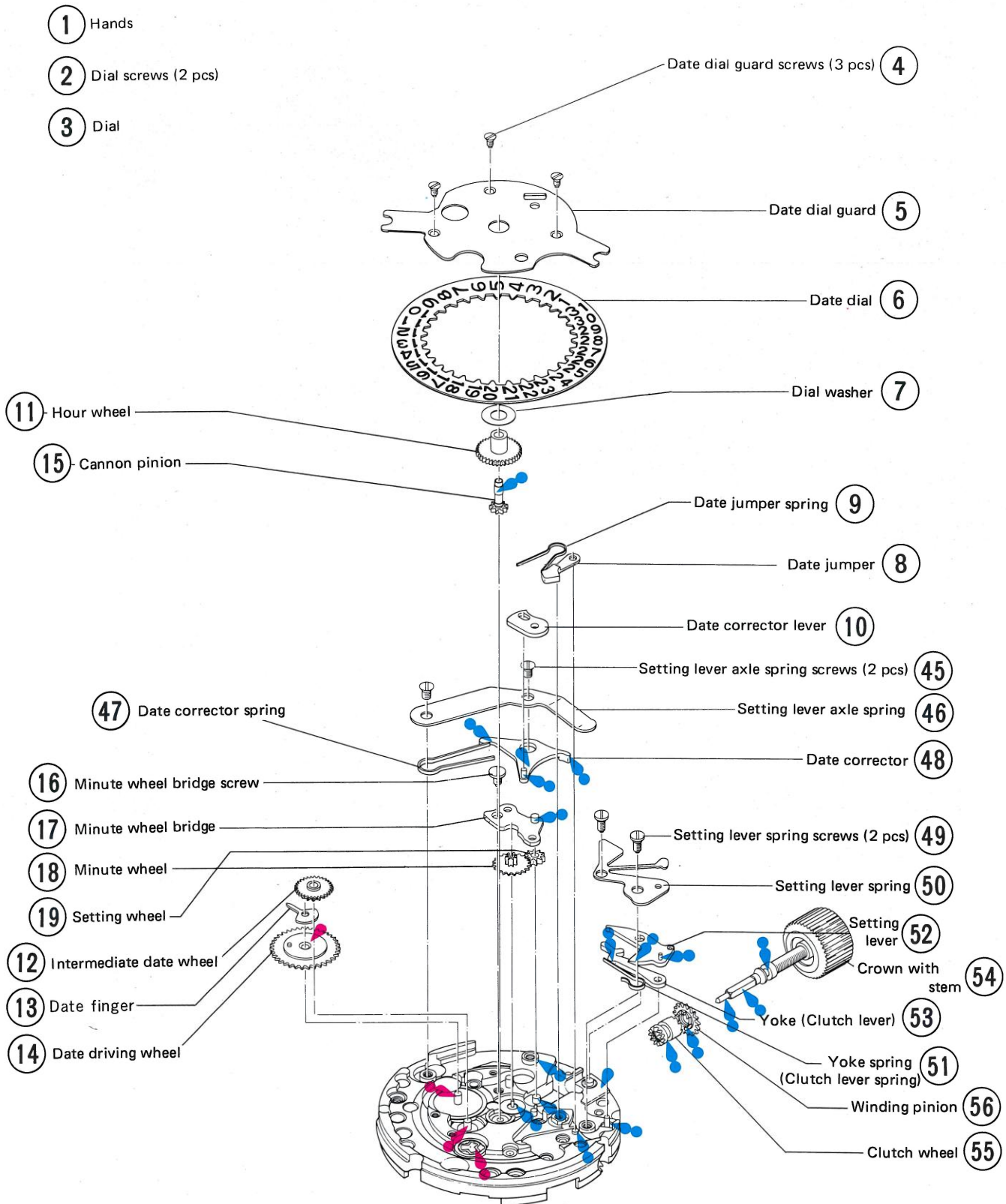
●▶ Normal quantity

▶ Extremely small quantity

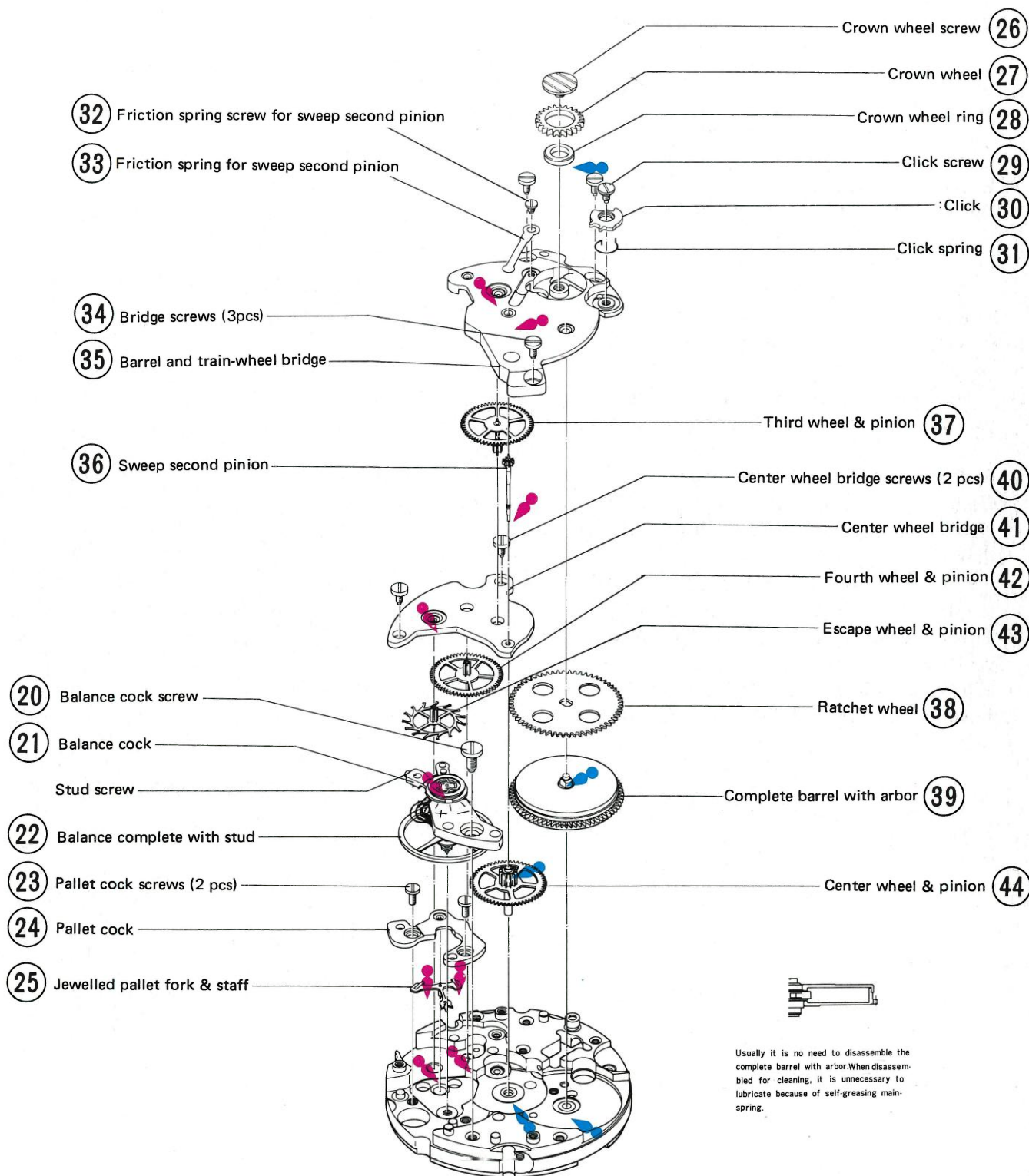


Movement

2202A Calendar Setting Mechanism



2202A Train Wheel, Escapement and Governor Mechanism



5) Date corrector mechanism

Fig. 1: Date is changed by pulling out the crown to the second click.

Fig. 2: Hands are set by turning the crown at the first click.

Date correction is achieved by repeating pull-out and push-in processes.

In this case, after pulling out the crown to the second click, it automatically returns to the first click when releasing the finger tips from the crown.

Action of each section is as follows:

Winding stem → Setting lever → Date corrector (Date corrector spring) → Date corrector lever → Date dial

Numbers marked in Figs. 1 and 2 indicate the operating sequence.

6) Date driving mechanism

Hour wheel → Intermediate date wheel → Date driving wheel → Date finger → Date dial

Force transmission from the hour wheel to the date dial is as above mentioned. The solid line in the diagram indicates the position just before starting date driving, and the double-dotted chain line those finishing date driving. (Fig. 3)

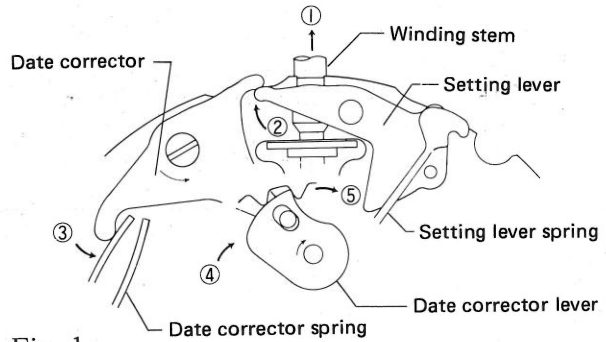


Fig. 1

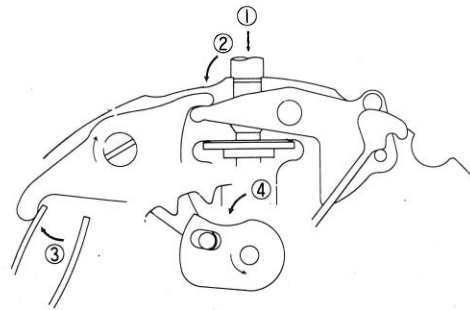


Fig. 2

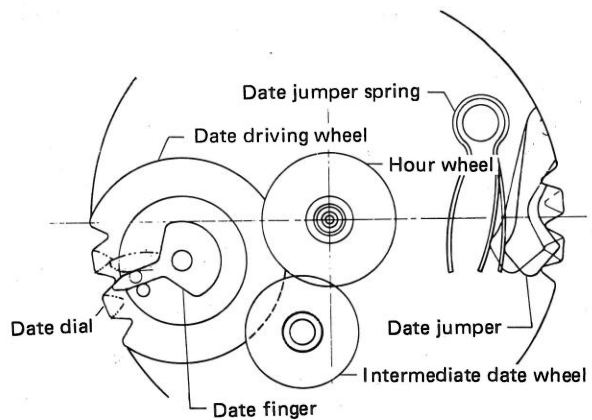


Fig. 3

2205A

(1) Specifications

Casing diameter 17.20mm
 Height 5.66mm
 Vibrations per hour 28,800
 (8 beats per second)
 Calendar with instant date setting mechanism (Pull-out type)
 Automatic winding (with auxiliary hand winding mechanism)
 Idle wheel system

(2) Features

This movement is designed based on calibre 2202, to which automatic winding mechanism is added. Other mechanisms are identical with 2202. Since the automatic winding mechanism can be separated from the other mechanisms, independent assembly of the automatic winding mechanism is possible, and it can be installed on the movement main body as is.

As this automatic winding mechanism adopts an idle wheel system of simple construction of parts, it is excellent in abrasion-resistant and shock-resistant characteristics. Winding ability is also stabilized.

On the other hand, by adopting a simple clutch mechanism, hand winding of the mainspring is achieved smoothly.

(3) Disassembly and assembly

Refer to 2202A for disassembling and assembling the train wheel, calendar, and date correcting mechanisms.

As for the automatic winding mechanism, disassemble according to Figs. ① - ⑯. Assemble by reversing the above procedures, Figs. ⑯ - ①, paying attention to the notes on the diagrams.

Note 3

Install the friction spring for intermediate pinion from the back side of the barrel and train wheel bridge before assembling the bridge. Confirm that the tip of the friction spring for intermediate pinion does not rub against the side of the barrel and train wheel bridge, or that its up-and-down motions are smooth. These are related to efficiency of the automatic winding mechanism.

Note 1

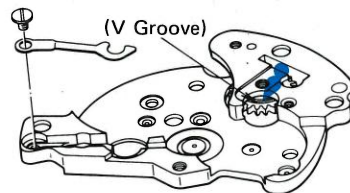
Before assembling the second reduction wheel and the intermediate pinion for ratchet wheel, set them as shown in the above diagram after lubricating them.

⑭ Second reduction wheel

⑭ Intermediate pinion for ratchet wheel

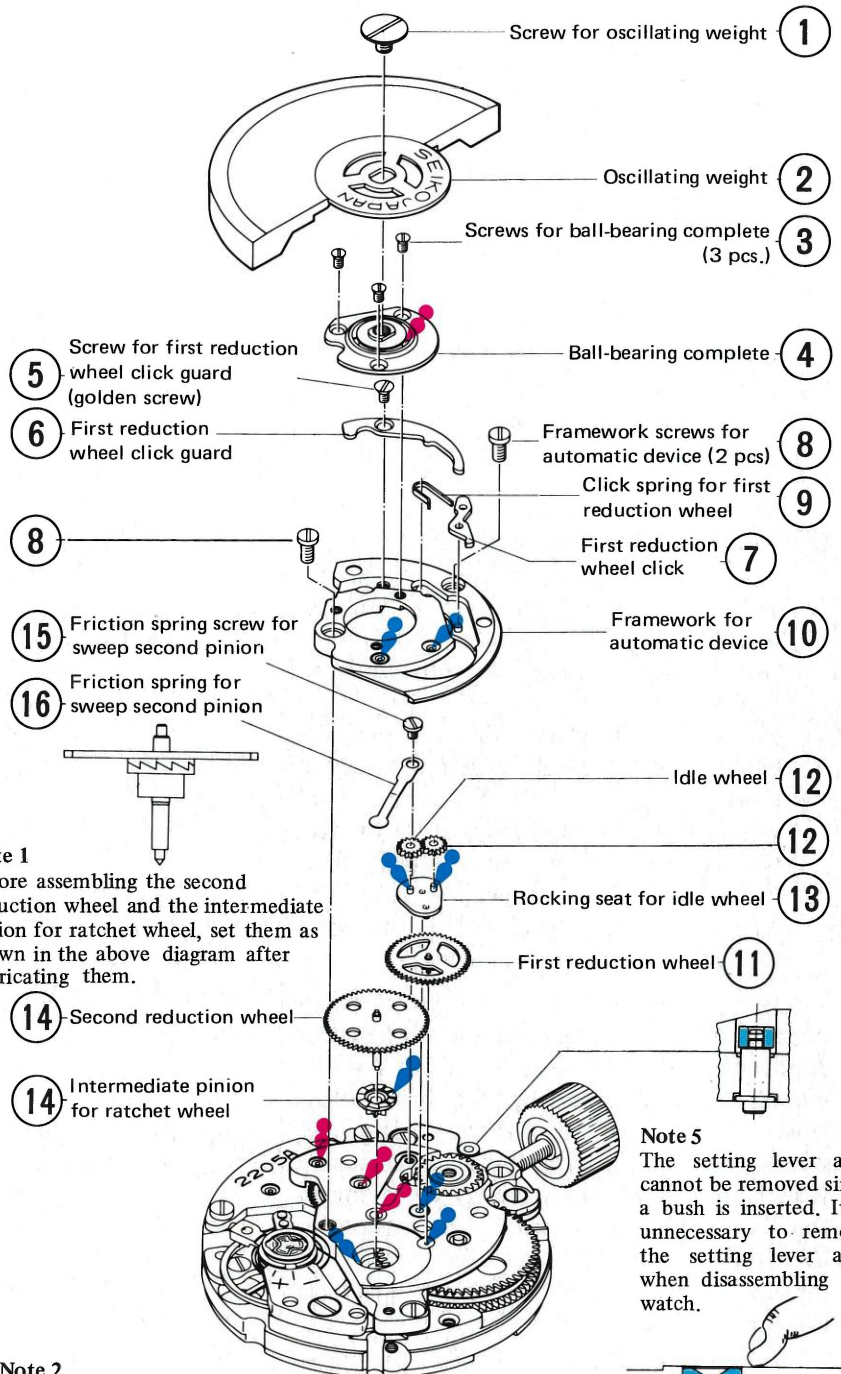
Note 2

The crown wheel is caulked on the barrel and train wheel bridge. Consequently, lubricate the V-grooved portion of the crown wheel from the back side of the barrel and train wheel bridge before assembling the bridge. If too much oil is applied, the bridge and other portions will become soiled; and if the oil is insufficient, it will cause inefficiency of the automatic winding mechanism.



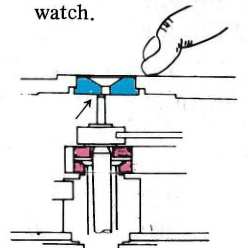
Note 4

When assembling the barrel and train wheel bridge, if the upper surface of the bridge is forcibly depressed in a condition that the upper pivot of the sweep second pinion and the frame hole of the bridge are not set correctly (refer to the upper diagram), the frame hole will be crushed (at the arrow mark) and it causes stopping or other malfunctions.



Note 5

The setting lever axle cannot be removed since a bush is inserted. It is unnecessary to remove the setting lever axle when disassembling the watch.



2205A Automatic Winding Mechanism

(4) Lubrication

The following colored symbols in the illustrated figures indicate the types of oil, quantities to be applied, and lubricating points. (Always comply with indications in figures.)

Types of oil

- ▶ Moebius Synt-A-Lube
- ▶ Seiko watch oil S-4

Oil quantity

- Sufficient quantity
- Normal quantity
- ▶ Extremely small quantity

(5) Automatic winding mechanism

When the oscillating weight revolves clockwise, the idle wheel (A) turns counterclockwise by action of the oscillating weight pinion; also the rocking seat for idle wheel revolves in the arrow direction. (The pin of the rocking seat for idle wheel revolves in a range of hole of the barrel and train wheel bridge.) In this case, idle wheel (A) transmits force by meshing with the first reduction wheel, and idle wheel (B) is freed from the first reduction wheel (Refer to Fig. 1)

When the oscillating weight revolves counterclockwise, the idle wheel (A) turns clockwise, moving the rocking seat for idle wheel and disconnecting the first reduction wheel. On the contrary, the idle wheel (B) meshes with the first reduction wheel and transmits force by revolving in the direction of the arrow. Consequently, the first reduction wheel always revolves in one direction (clockwise) to wind up the mainspring. (Refer to Fig. 2)

Force transmission of the automatic winding mechanism is indicated on the right.

The first reduction wheel click prevents reverse revolution of the first reduction wheel by the action of the click spring for the first reduction wheel; that is, it prevents mainspring from loosening.

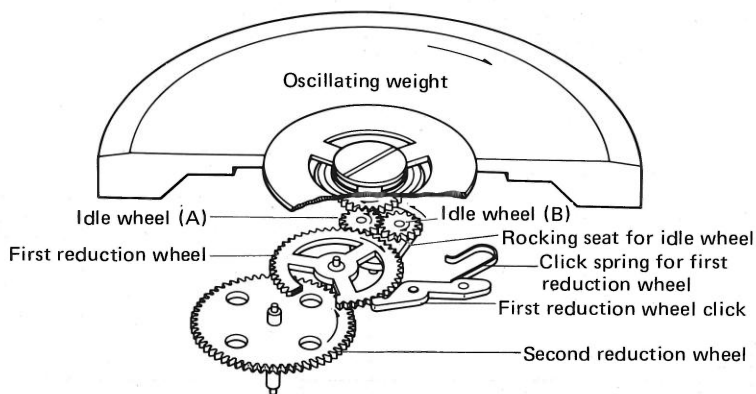


Fig. 1

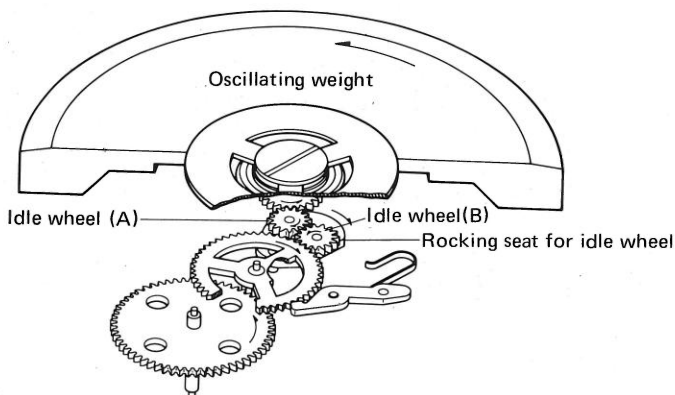
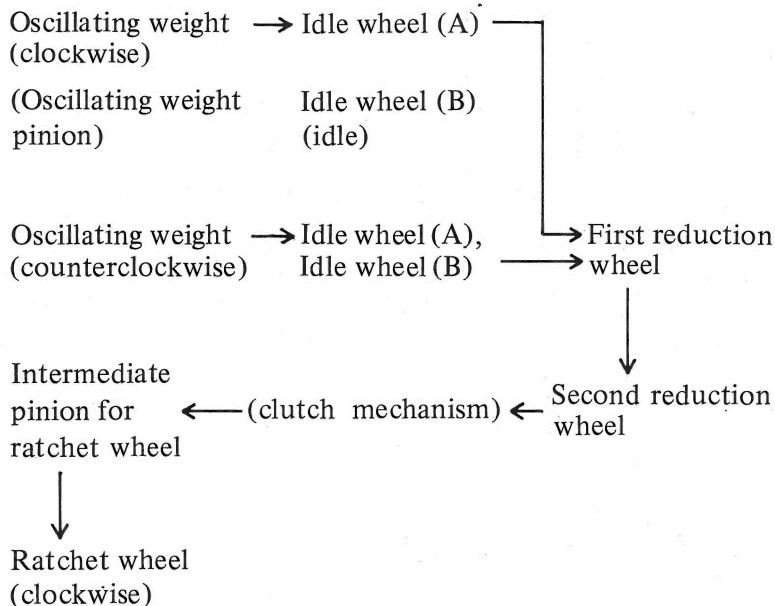


Fig. 2



2205A Automatic Winding Mechanism

(6) Clutch mechanism

The clutch mechanism makes possible both automatic winding and hand winding of the mainspring. Compared with conventional mechanisms, this device is very simple and is the same as meshing of the winding pinion and the clutch wheel. (Refer to Fig. 3)

Force transmission of the hand winding mechanism is as follows:

Crown → Winding pinion → Crown wheel

Intermediate pinion ← Ratchet wheel
for ratchet wheel

(Slip) (Winding the mainspring)

(Refer to Fig. 4)

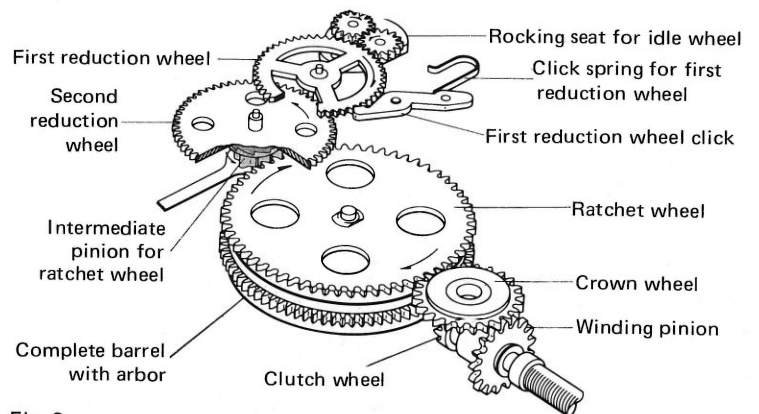


Fig. 3

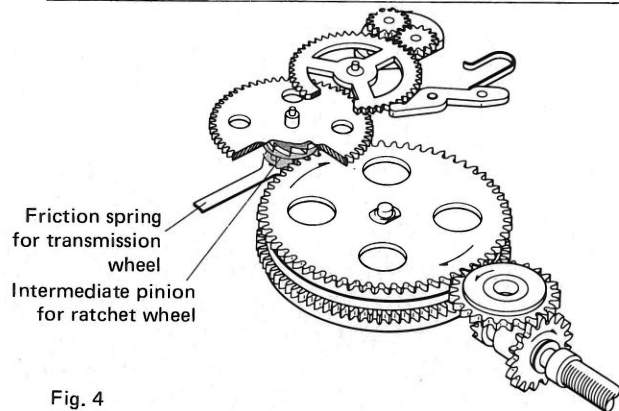
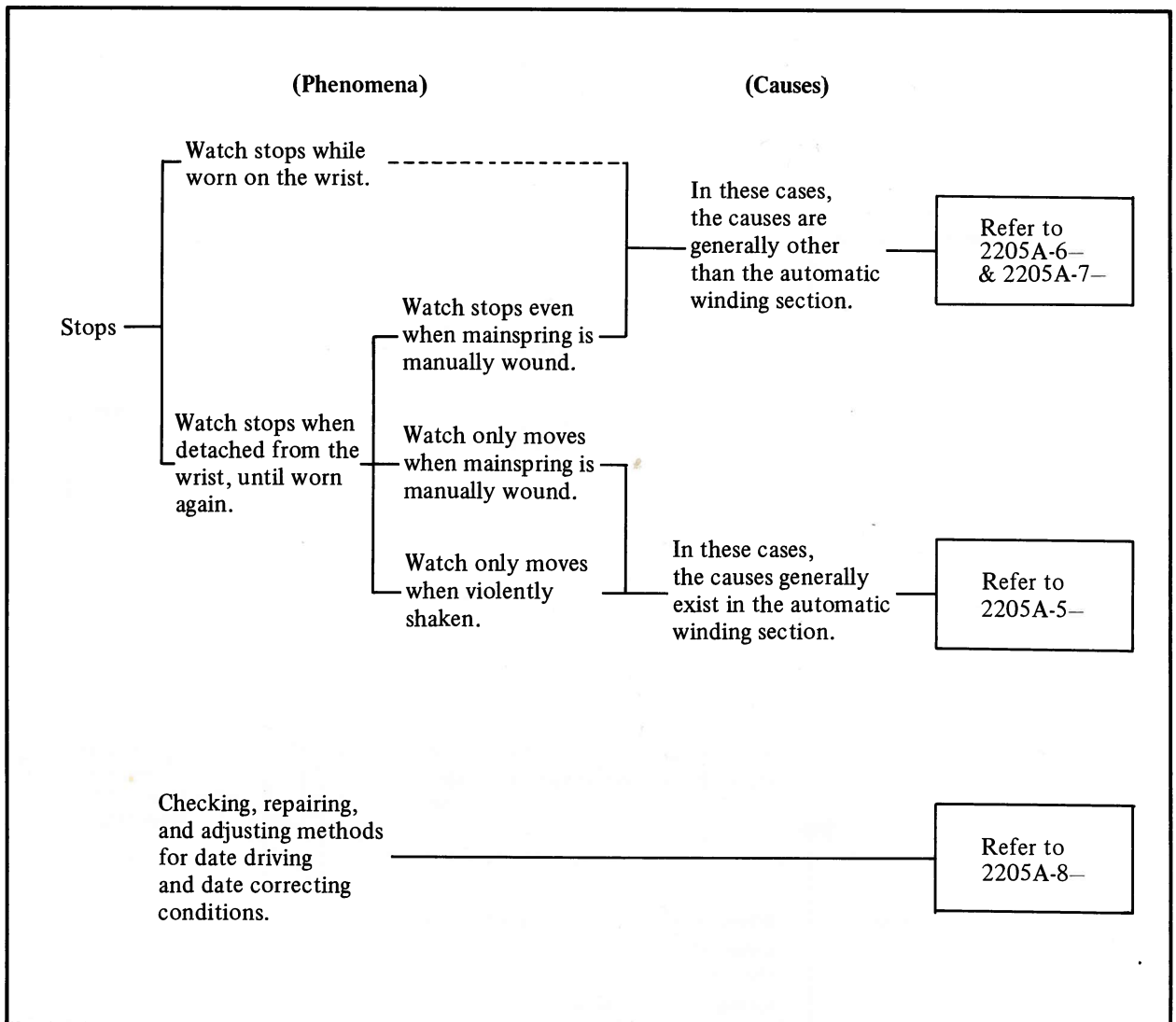


Fig. 4

2205A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

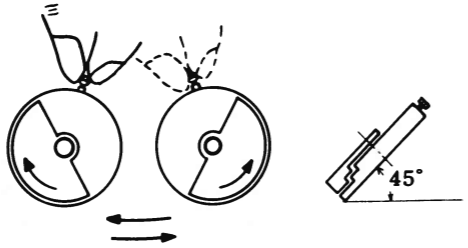
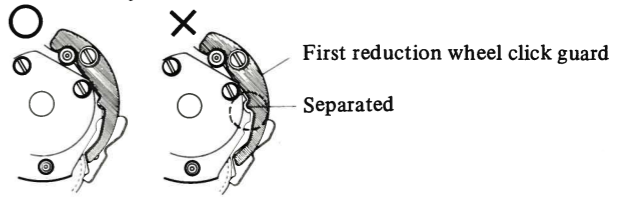
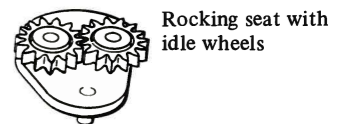
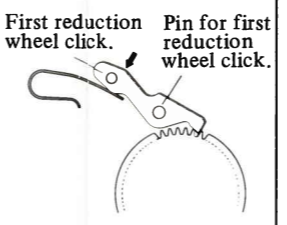
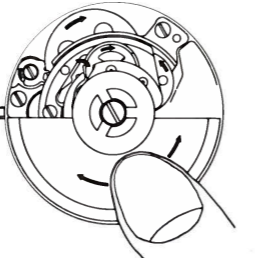
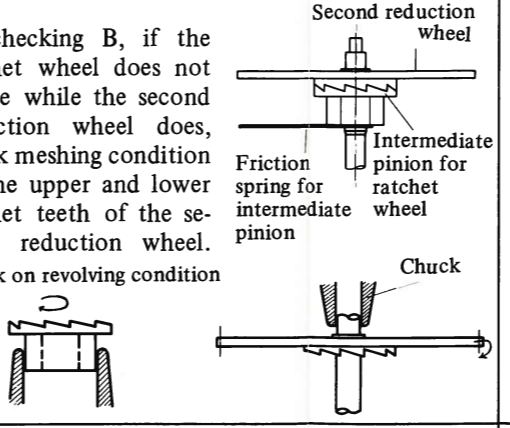
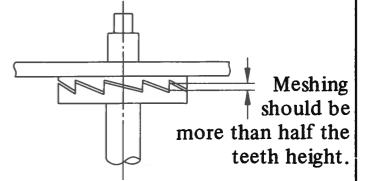
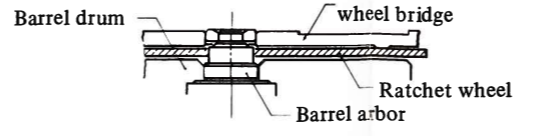
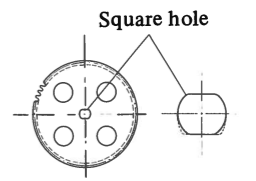
The pages of this guide mention ways and means of checking, repairing and adjusting unfunctioning Cal. 2205 watches and related further details on Lady's Automatic Winding Watches.

When accepting orders for repairing watches, always make sure of the following behavior to discover causes of the malfunction.



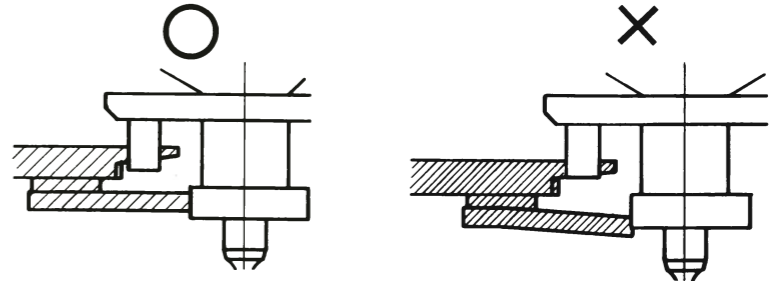
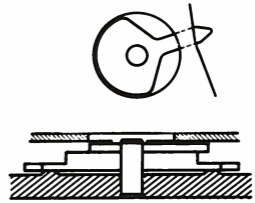
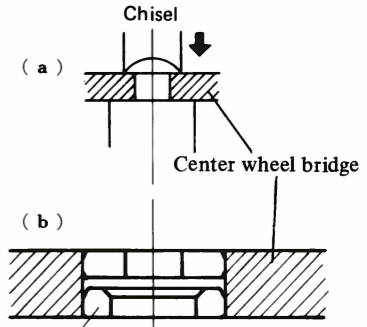
2205A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

For malfunction
1. in the automatic
winding section.

Checking (1)		Checking (2)	Results	Repairing and adjusting method.
A	<p>Incline watch about 45° and shake repeatedly, gently and slowly. Next, wind the main-spring manually about one revolution of the ratchet wheel, then check whether the oscillating weight moves smoothly or does not.</p> 	<p>1 As explained in A, slowly shake the watch and check whether the motion of the oscillating weight meets some resistance. (The oscillating weight may rub against the first reduction wheel click guard.)</p>	<p>Oscillating weight rubs against the first reduction wheel click guard.</p>	<p>While pushing the first reduction wheel click guard toward center portion of the bridge, tighten the screw sufficiently.</p> 
	<p>Oscillating weight does not rub against the first reduction wheel click guard; however, some resistance is felt.</p>	<p>Replace the idle wheel. It is convenient to use a single-body idle wheel and rocking seat for idle wheel.</p> 	<p>2 In checking B, check whether the first reduction wheel click moves lightly or does not.</p> 	<p>Does not move lightly (Will not return easily)</p>
B	<p>As shown in the following diagram, move the oscillating weight slowly to the right and left with finger at an angle where the functioning of the automatic winding is clearly visible. (Approximately ten times).</p> 	<p>3 In checking B, if the ratchet wheel does not rotate while the second reduction wheel does, check meshing condition of the upper and lower ratchet teeth of the second reduction wheel. Check on revolving condition.</p> 	<p>Shallow meshing of the upper and lower ratchet teeth.</p> <p>Loosened mechanism.</p>	<p>If burrs exist between the upper and lower teeth, remove them. If teeth meshing is still shallow, replace the second reduction wheel.</p> <p>When the revolving condition is loose, replace the parts. Even when the transmission wheel holder spring is not effective, it may sometimes unmesh the meshing.</p> 
	<p>4 Check whether the ratchet wheel can or can not be easily removed from the barrel arbor.</p> 	<p>Ratchet wheel does not easily removed from the barrel arbor.</p>	<p>Should installing the barrel arbor prove too difficult, use a fine file and slightly expand the ratchet wheel hole. Expand the hole as shown by dotted line in diagram.</p> 	

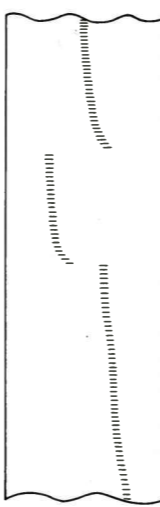
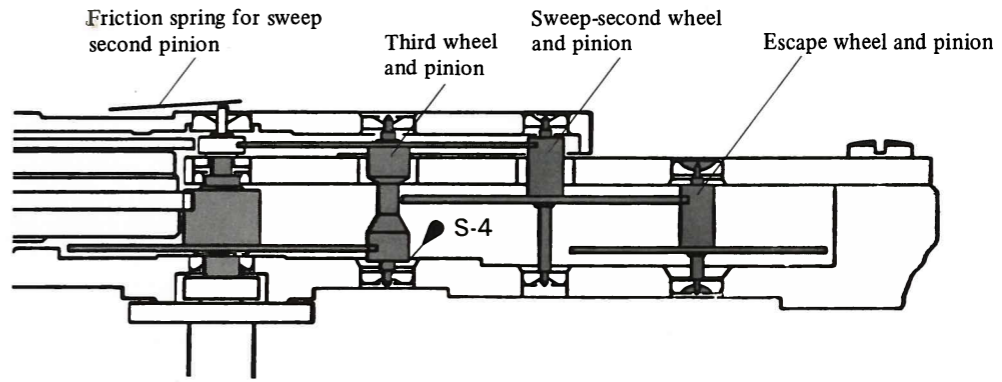
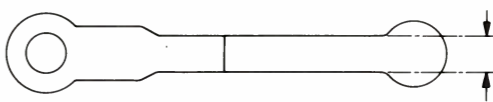

2205A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

2. When malfunction exists elsewhere than in the automatic winding section (1)

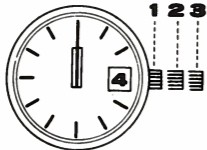
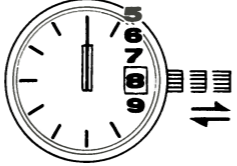
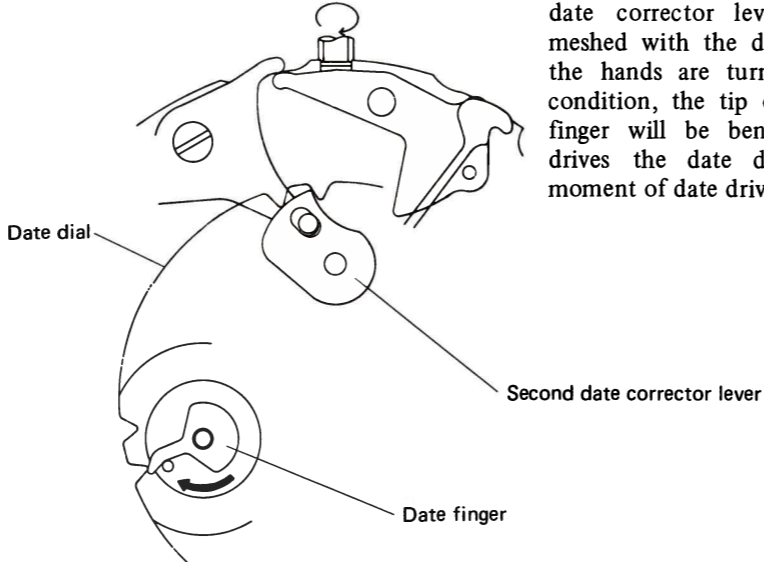
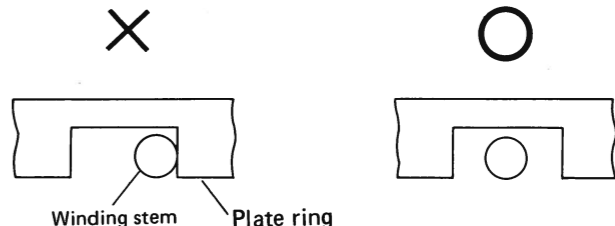
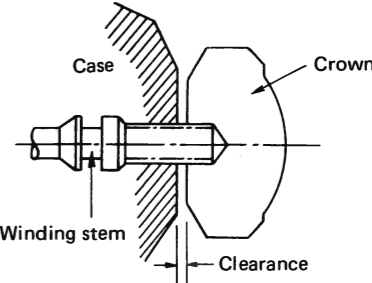
		Checking	Repairing and adjusting methods
When watch does not move even with mainspring fully wound.	1	Check whether or not the pallet tip is detached from the roller with jewel.	Adjust so that the tip comes to the center of the roller with jewel.
	2	Check whether or not the pallet tip rubs against the roller jewel by turning over the watch.	
	3	When the train wheel does not rotate even when the balance and the pallet are detached, check on the following: a. Is there any dust or adherence? b. Is the date finger raised, thus rubbing the hole (inner side) of the date dial guard? Refer to the diagram on the right.	To prevent rise of the date finger, apply small quantity of oil (Moebius A) between the date finger and the date driving wheel. 
When amplitude of the balance movement is not sufficient even when the mainspring is manually wound.	4	Check on shake of the train wheel (shake in upper and lower direction). a. Does the teeth of center wheel and pinion rub the barrel due to too much shake of the center wheel and pinion? (Check position of the upper hole jewel for center wheel.) b. Is there any shake between the barrel and barrel arbor?	Correct shake of the train wheel. Correct shake of the center wheel bridge as follows or make replacement. <ol style="list-style-type: none"> 1. Remove the jewel with a chisel. 2. Narrow the hole diameter on the bridge (Diagram a.) 3. Drive in the jewel (Align jewel height with the bridge surface as shown in diagram b.) Create shake by lightly striking the barrel arbor from opposite side of the cover. 
	5	Check for oil shortage on the pallet jewels	Wash the pallet with benzine and apply oil. (Moebius A) to the hole jewel.

2205A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

3. When malfunction exists elsewhere than in the automatic winding section (2)

Checking		Repairing and adjusting methods.
<p>When watch moves and stops intermediately or starts to move given a light shock.</p>	<p>1 Check watch for interrupted beating rate as shown in diagram when measuring watch with timegrapher.</p>  <p style="text-align: center;">↓</p> <p>Check whether or not the torque of mainspring is transmitted sufficiently and the train wheel rotates lightly.</p>	<p>When the beating rate appears to be interrupted, thoroughly wash the third wheel and pinion, sweep-second wheel and pinion, and the escape wheel and pinion.</p> <p>Using Ultrasonic washer is recommended. When using a brush for washing, wash well the wheels and pinions.</p> 
	<p>2 Check on shake of the third wheel and pinion, sweep second wheel and pinion, escape wheel and pinion and teeth tips.</p>	<p>After washing, if shake of wheels still exists or teeth tips are damaged, or interrupted beating rate still exist, then the sweep-second wheel and pinion and the escape wheel and pinion should be replaced. Apply small quantity of S-4 oil to lower pivot of the third wheel and pinion.</p>
	<p>3 Check on installation position of the friction spring for sweep-second pinion and see how it presses.</p> <p>Has the installation position slipped? Is the pressing force of the friction spring for sweep-second pinion too strong or too weak?</p>	<p>If malfunction still exists, adjust as follows:</p> <p>When the position has slipped</p>  <p>Adjust so that the pivot end of the sweep second pinion enters the range indicated by the arrows.</p> <p>When the spring is too strong or too weak</p>  <p>Bending of the tip some 5-6 times the thickness of the spring is sufficient.</p>
	<p>4 In this case, check on oil shortage of the pallet jewels.</p>	

2205A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

	Checking	Repairing and Adjusting Method
<p>When date driving fails, or when the crown does not smoothly return from the second click to the first click after date correction, the following inspection and repair procedures are recommended.</p> 	<p>As shown in the diagram below, make date correction by pulling out crown and check returning condition.</p>  <p>a. Date is changed by pulling crown out to the second click. b. Then, detach the finger, and slightly rotate crown. If it does not, in this condition, return to the first click, it is faulty.</p> <p>(Reasons)</p>  <p>When the crown does not return to the first click, the date corrector lever remains meshed with the date dial. If the hands are turned in this condition, the tip of the date finger will be bent, since it drives the date dial at the moment of date driving.</p>	<p>a. Apply sufficient amount of silicon grease to the crown gasket.</p> <p>b. In case of water resistant case, if the winding stem contacts the plate ring or the crown pipe of the case, adjust the crown position to the center.</p>  <p>c. When the winding stem or the crown have been replaced and the clearance between crown and case is widened, the pipe packing of crown might become detached, and the crown refuse to return at the second click. Then reduce clearance to minimum between the crown and the case.</p>  <p>d. When the date finger is bent or split, replace it.</p>

2206A

(1) Specifications

Casing diameter	17.20 mm
Height	5.85 mm
Vibrations per hour	28,800 (8 beats per second)
Automatic winding	(with auxiliary hand winding mechanism)
Idle wheel system	
Calendar	Day & date, Bilingual changeover mechanism for day indication

With instant day and date setting mechanism (crown revolving system)

(2) Features

A new model with the week days plus the instant day and date setting mechanism added to the existing Calibre 2205. The numbers of parts are reduced, adequately considering easy disassembling and assembling operations and stabilized functions. Regarding the automatic winding mechanism, it adopts an idle wheel system, rendering the mechanism excellent in abrasion resistant and shock resistant characteristics; the winding ability is also stabilized. Since the automatic winding mechanism can be separated from other mechanisms, an independent assembly of the automatic winding mechanism is possible, enabling this mechanism alone to be installed on the movement main body. On the other hand, by adopting an unusual simple clutch mechanism, hand winding of the mainspring is smoothly achieved.

(3) Disassembly and assembly

Refer to calibre 2202A for the train wheel and regulator mechanism; refer to calibre 2205A for the automatic winding mechanism. As for the calendar setting mechanism, disassemble it according to Figs. (1) – (33). Assemble in reverse order to the above procedures, Figs. (33) – (1), paying attention to the comments on the diagrams.

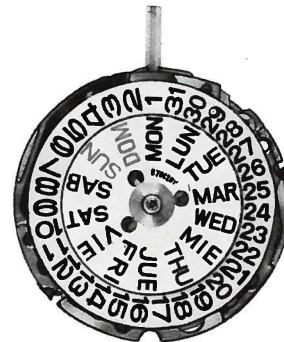
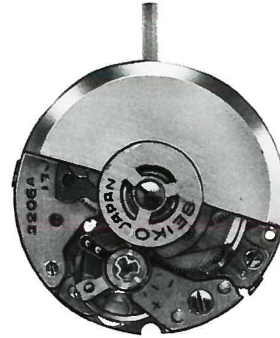
(4) Lubrication

The following colored symbols in the illustrated figures indicate the types of oil, quantities to be applied and lubricating points. (Always comply with indications in the figures for lubrication).

Types of oil	Oil quantity
● Moebius A	●●● Sufficient quantity
● Seiko watch oil S-4	●● Normal quantity
	● Extremely small quantity

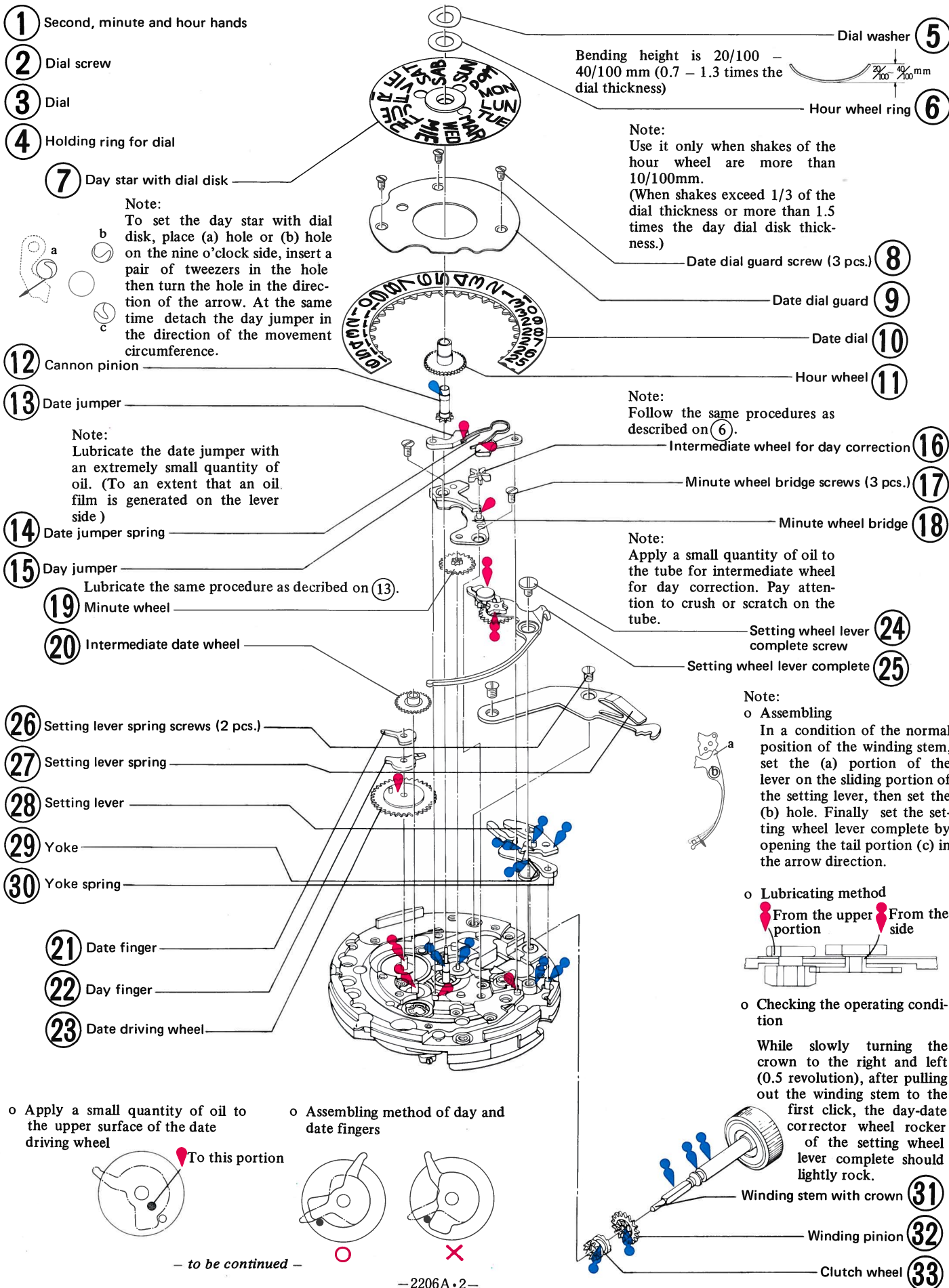
Other points requiring lubrication, in addition to the above symbols are separately indicated. Apply oil correctly.

Note: Unindicated portions do not require lubrication.



Movement

2206A CALENDAR, SETTING MECHANISM



2206A CALENDAR, SETTING MECHANISM – *Continued*

– continued –

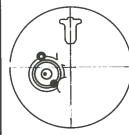

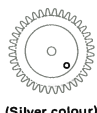




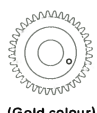


o Shapes of the day and date fingers and date driving wheel have been modified. In replacing them during repair, select the correct parts according to the following combination and dividing method.

- *556221 (Date finger = Silver colour)
- *802221 (Date driving wheel = Silver colour)
- *868220 (Day finger = Silver colour)

Use only when the tube for date driving wheel screw pivoting on the main plate without eccentric post.

- *556222 (Date finger = Gold colour)
- *802222 (Date driving wheel = Gold colour)
- *868221 (Day finger = Gold colour)

Use only when the tube for date driving wheel screw pivoting on the main plate with eccentric post.

Main plate	(Tube for date driving wheel screw)	Date driving wheel	Day finger	Date finger
	 Without eccentric post	 (Silver colour)		
	 With eccentric post	 (Gold colour)		

2206A SETTING MECHANISM

Crown normal position (winding the mainspring) – Fig. 8

The mainspring can be wound by revolving the crown when the winding pinion gears with the clutch wheel.

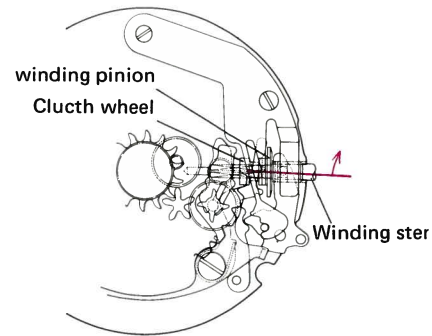


Fig. 8

Position where the crown is pulled out to the first click (Setting day and date) – Fig. 9

When the clutch wheel and the setting wheel are geared, turn the crown clockwise and the date dial is forwarded. Turn the crown counterclockwise, then the day star can be quickly forwarded.

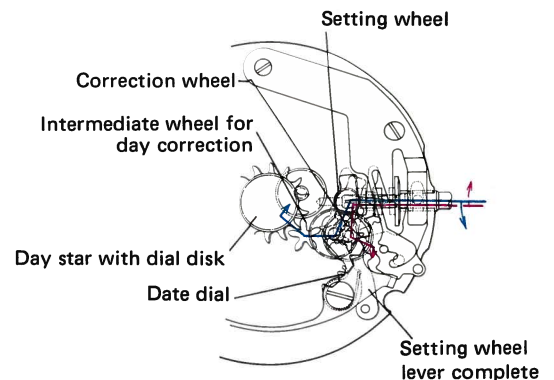
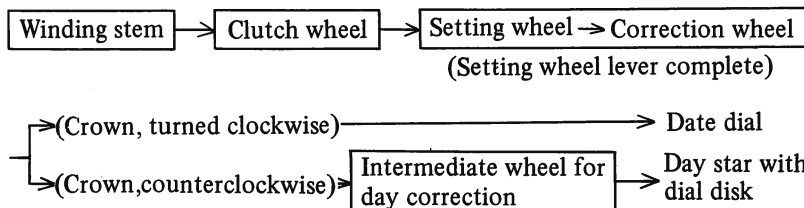


Fig. 9

Position where the crown is pulled out to the second click (Setting time) – Fig. 10

As the setting wheel lever complete is pushed by the setting lever, the clutch wheel, the setting wheel and the minute wheel are meshed with one another, and at this position, turn the crown to set the hands.

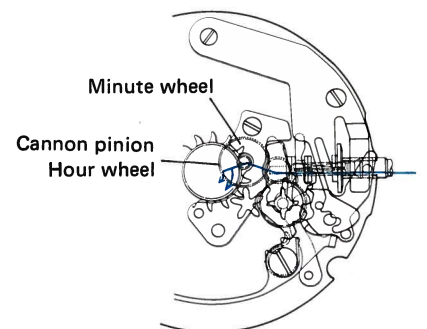
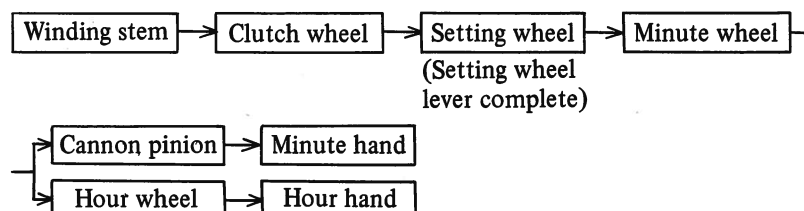


Fig. 10

2406A (2409, 2415, 2418 derived from this calibre)

(1) Specifications

Casing diameter	19.00mm
Height	4.58mm
Vibrations per hour	28,800

(8 beats per second)

Automatic winding (with auxiliary hand winding mechanism)

Setting wheel lever system

Calendar (day, date, Bilingual change-over mechanism for day indication and Instant day and date setting mechanism)

(2) Features

Thin and dress type automatic, multifunctional winding watch

Movement size is designed in two types for Ladies' and Gents' watch as 24 series calibres list below.

High-Vibration watch with stabilized time accuracy

By adopting a high-vibration mechanism (8 beats), exceptional timing accuracy is maintained. Winding capacity, which is the life of the automatic winding watch, has been ingeniously devised, creating a reliable timepiece.

Simple day & date setting mechanism

The day and date setting mechanism is also compactly designed around the second setting lever. This makes it extremely easy to disassemble and assemble the parts, and the regularity of the day and date mechanism maintained with steadiness.

(3) Disassembling and Assembling

Disassemble watch as in Fig. ① → ⑤⑨

Assemble watch as in Fig. ⑤⑨ → ①



MOVEMENT

(4) Lubrication

The following symbols in the illustrated figures indicate the types of oil, the quantities to be applied, and the lubricating points.

Types of oil

- SEIKO watch oil S-6
- SEIKO watch oil S-4
- SEIKO watch oil S-3
- Moebius synt-A-Lube
- Moebius synt-V-Lube

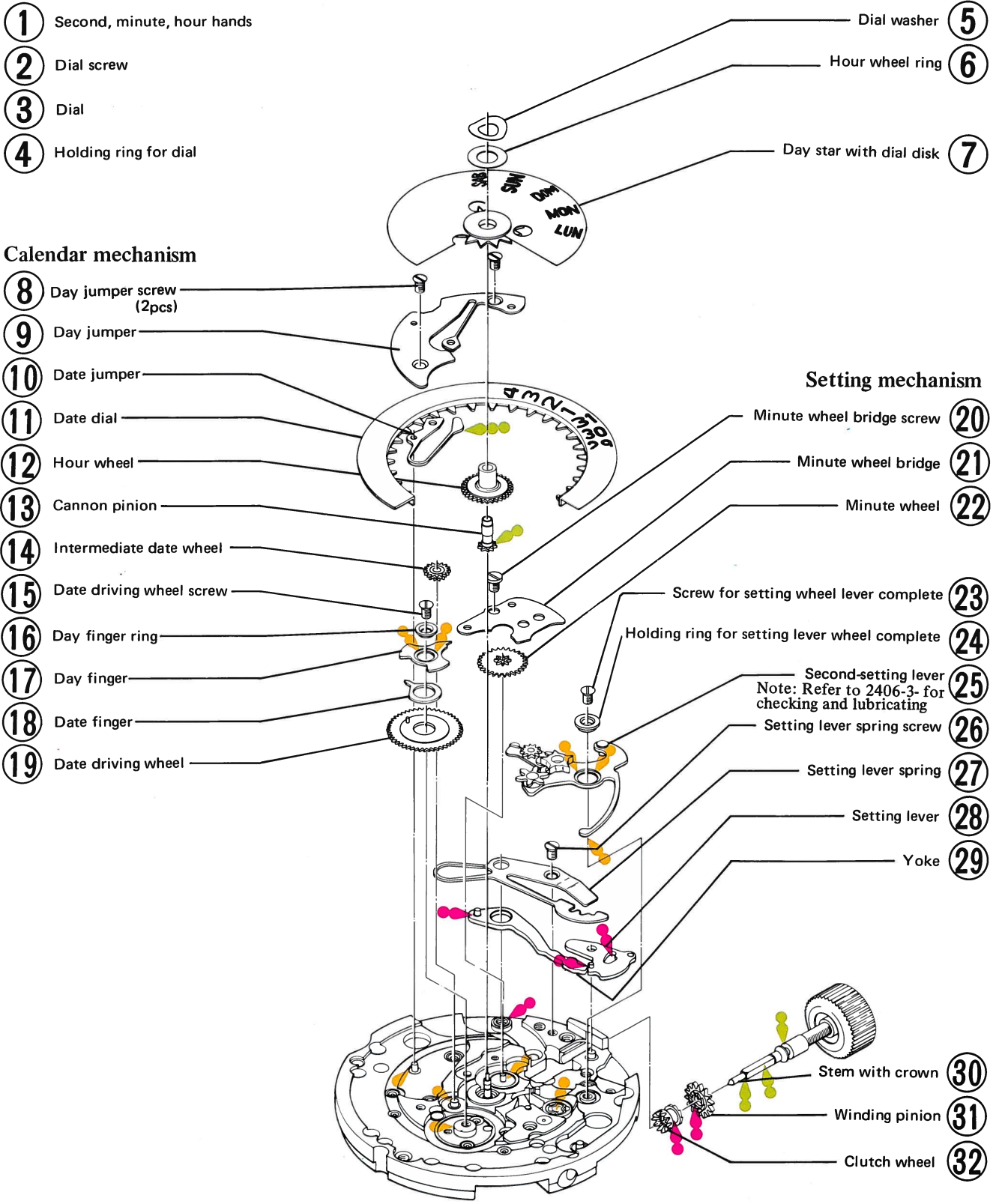
Oil quantity

- : Extremely small quantity
- : Normal quantity
- : Sufficient quantity

24 SERIES CALIBRES AND THEIR FEATURES

Calibre No.	Casing diameter (mm)	Height (mm)	Train wheel Mechanism		Calendar			Day date correcting	
			hour & minute hands	Sweep second	Date	Day	Bilingual change-over mechanism	Date correcting	Day correcting
2406	19.0	4.5		o	o	o	o	o	o
2415	19.0	4.5	o		o			o	
2409	24.0	4.5		o	o	o	o	o	o
2418	24.0	4.5	o		o			o	

2406A Calendar and Setting Mechanisms



Notes on disassembling and assembling

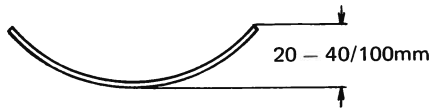
How to remove hands

Since the dial is thin and easy to bend, use a bow-type hand remover when detaching hands.



Dial washer

The bending should be 20/100 – 40/100mm (0.7 – 1.5 times thickness of dial)



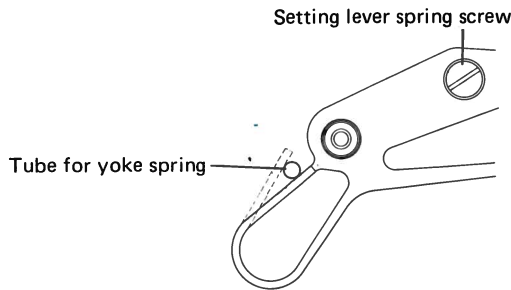
Hour wheel ring

This is used when shake of hour wheel (day star with dial disk) is more than 8/100mm. (When shaking is more than 1/4 dial thickness or thickness of day star with dial disk).

Yoke spring (Clutch lever spring)

Set yoke spring at position shown in diagram.

When removing setting lever spring screw, be careful the screw will not spring out.

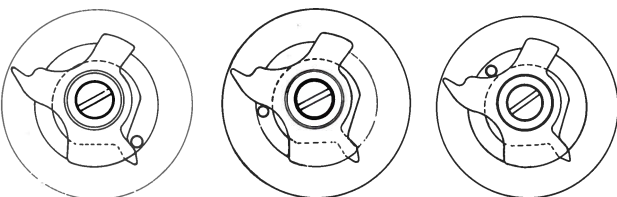


Pushing in cannon pinion

Push in cannon pinion after assembling barrel and train wheel bridge to prevent shake of center wheel and pinion from becoming excessive.

Assembling day finger and date finger

When assembling day finger, carefully note position of date driving wheel pin. Assemble date finger by placing bent surface upward.



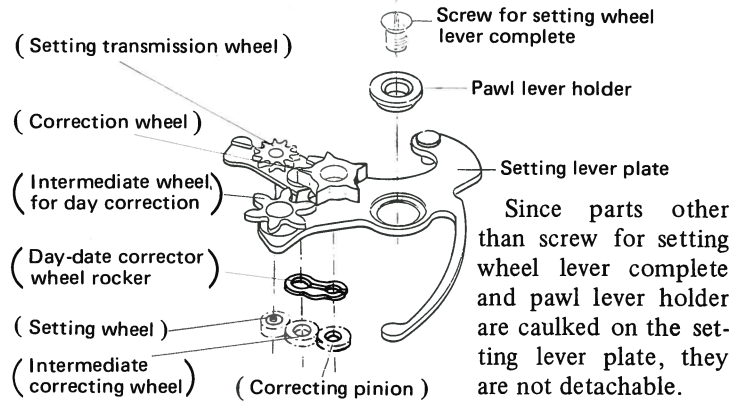
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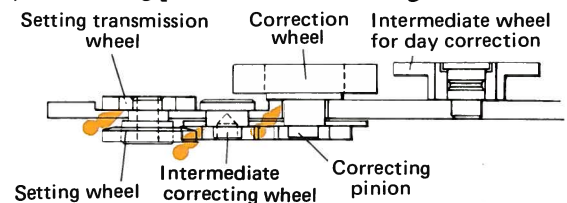
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Checking on second-setting lever

1) Structure of second-setting lever



2) Lubricating points on second-setting lever

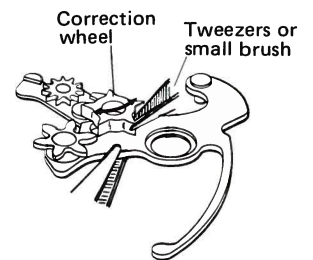


Apply oil from clearances between Second setting lever complete and Intermediate correcting wheel, Correcting pinion and Setting wheel.

3) Checking performance of day-date corrector wheel rocker

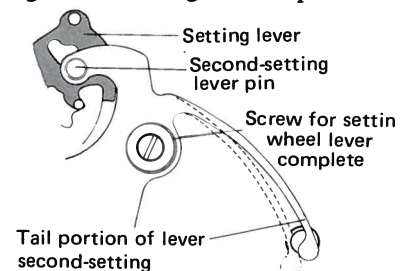
Before assembling second-setting lever, check day-date corrector wheel rocker to note whether or not it moves smoothly along the long hole when correction wheel is moved with a small brush or a pair of tweezers.

Note) If excessive oil is applied to day-date corrector wheel rocker, motion of day-date corrector wheel rocker will become defective due to adhesion of second-setting lever complete and day-date corrector wheel rocker.



4) Precautions on assembling second-setting lever to plate

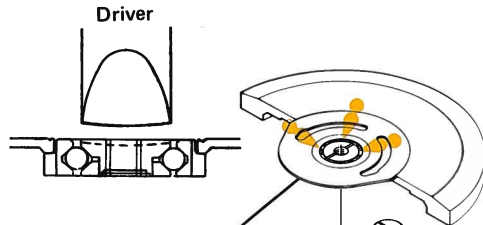
After setting second-setting lever pin in hole of setting lever and tightening screw for setting wheel lever complete, set second-setting lever by bending its tail portion in direction of arrow.



2406A Automatic winding, Train wheel, Escapement and Governor Mechanisms

Oscillating weight

- 1) Since groove of the oscillating weight screw has a curve, use a driver as shown on the right.
- 2) Be careful in pressing the oscillating weight screw here, since if forcibly pressed, the bearing axle may come off.



Automatic winding mechanism

- 33 Oscillating weight
- 34 Framework screw for automatic device (2pcs)
- 35 Framework for automatic device
- 36 Differential wheel
- 37 First reduction wheel

- Crown wheel screw 38
- Crown wheel ring 39
- Crown wheel 40
- Barrel & train-wheel bridge screw (4 pcs) 41
- Barrel & train-wheel bridge 42
- Do not detach transmission wheel and first reverser idler (If you have to disassemble, refer to the next page)
- (Second reduction wheel) When lubricating, refer to the next page.

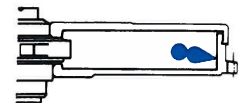
Train wheel mechanism

- 43 Third wheel & pinion
- 44 Sweep second wheel & pinion
- 45 Escape wheel

- Friction spring screw for sweep second pinion 46
- Friction spring for sweep second pinion 47
- Sweep second pinion 48
- Center wheel bridge screw 49
- Center wheel bridge 50
- Second reverser idler 51
- Center wheel and pinion with cannon pinion 52
- Ratchet wheel 53
- Complete barrel with arbor 54

Escapement and Governor mechanism

- 55 Balance cock screw
- 56 Balance Complete
- 57 Pallet cock screw
- 58 Pallet cock
- 59 Pallet

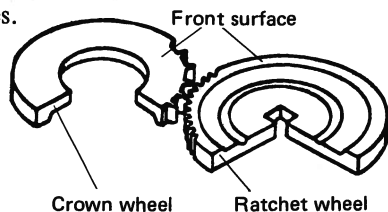


It is unnecessary to disassemble the complete barrel with arbor. When it is disassembled and washed inadvertently, use the SEIKO oil S-3.

Note on disassembling and assembling

Assembling crown wheel and ratchet wheel

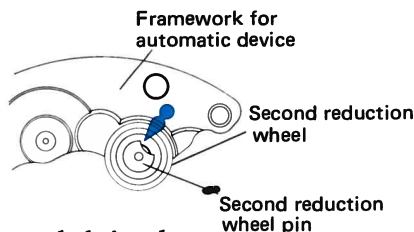
When assembling the crown wheel and the ratchet wheel, do not mistake their front with rear surfaces.



Framework for automatic device

Since the second reduction wheel is caulked on the framework for automatic device, they are not detachable from each other.

Apply oil from this crescent-shaped groove of second reduction wheel pin.



Lubricating Third wheel lower hole jewel

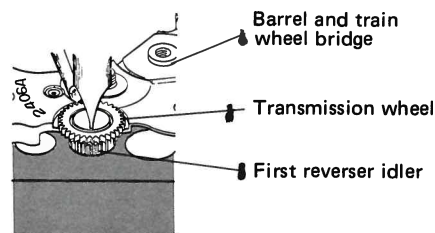
Since clearance between third wheel lower hole jewel and center wheel and pinion with cannon pinion is small, apply oil only in small quantity to third wheel lower hole jewel.



Disassembling Transmission wheel and First reverser idler

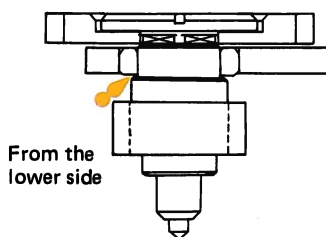
Do not detach transmission wheel and first reverser idler as they are difficult to assemble. Wash them together as they are, with the barrel and train wheel bridge.

If you have to disassemble, first place barrel and train wheel bridge on the reverting stake; and then insert first reverser idler in the hole of the reverting stake. Next, take them apart by loosening transmission wheel screw after inserting the tip of the screw-driver into the clearance between the teeth of transmission wheel and stopping its revolution.



Lubrication

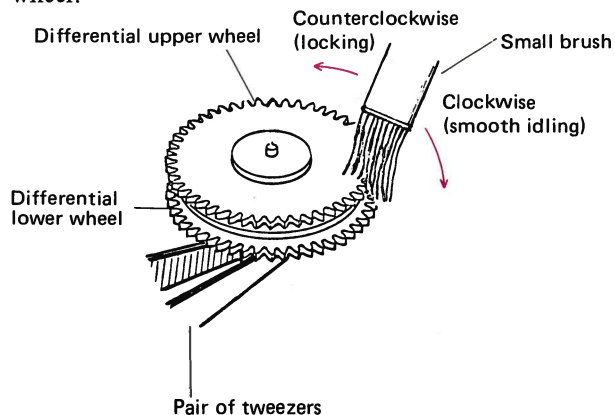
Lubricate them through clearance between barrel & train wheel bridge and first reverser idler.



Checking on locking and smooth idling of differential wheel

1) Checking on differential wheel

Using a small brush or soft material, confirm locking and smooth idling for both the upper and lower wheels before assembling differential wheel.



Facing the pinion lower side . . .

Clockwise . . . Revolves smoothly (SMOOTH IDLING)

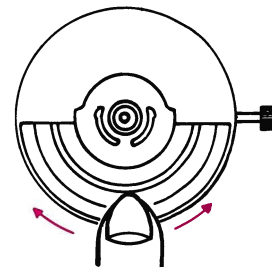
Counterclockwise . . . Stops after moving slightly (LOCKING)

2) Checking on the differential wheel with oscillating weight smooth idling

Should oscillating weight revolve over 180° after the crown is wound 5 revolutions and released by 2.5 revolutions, this is a sign that some wheel motion is not functioning properly.

Check the following if this happens.

- Check on malfunction of the differential wheel
- Check if there is an insufficiency of shake in sections of automatic winding and train wheel



Checking on fault in locking

Turn differential wheel by moving oscillating weight clockwise and counterclockwise each 90° ten times alternately. At this time, should oscillating weight reverse over 45°, this indicates a malfunction in locking.

Clean differential wheel with benzene or S-clean.

It is not necessary to lubricate inside differential wheel which is self-greasing.

2406A Setting Mechanism

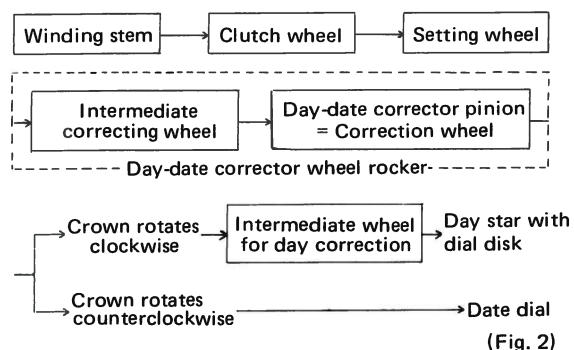
Normal position of crown (winding the mainspring)

In the position with winding pinion and clutch wheel interlocked, the mainspring is wound manually. (Fig. 1)

First click of crown (correction of day and date)

When clutch wheel and setting wheel are interlocked, and crown is rotated clockwise, day-date corrector wheel rocker moves toward day star with dial disk side, and permits day setting. (Fig. 2)

When crown is rotated counterclockwise, day-date corrector wheel rocker moves towards date dial, allowing date adjustment.



Second click of crown (setting time)

The second setting lever moves, pressed by setting lever and setting transmission wheel attached to setting wheel lever complete and interlocks with minute wheel. In this position, setting by hand is possible when crown is revolved. (Fig. 3)

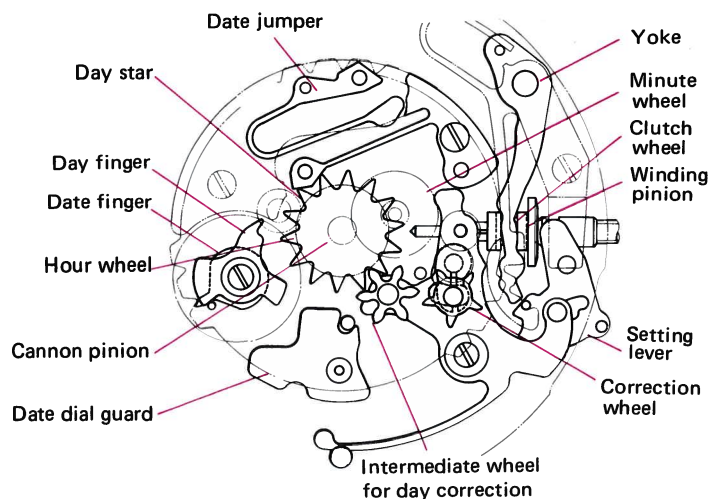
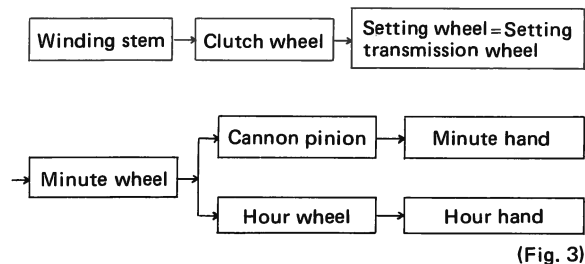


Fig. 1

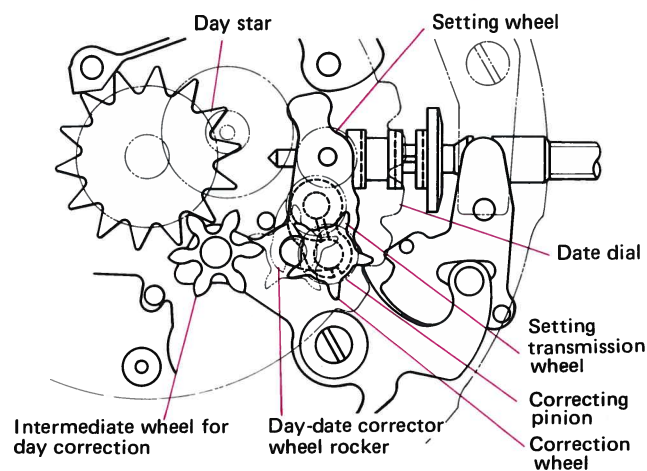


Fig. 2

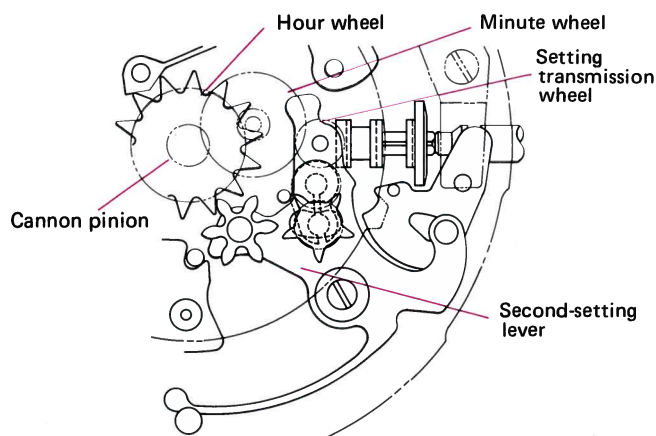


Fig. 3

2517B (Seikomatic lady calendar)

1) Specifications

Casing diameter	17.20 mm
Height	5.85 mm
Vibrations per hour	19,800

Automatic winding (with auxiliary hand winding)

Calendar (with instant date setting mechanism)

2) Automatic winding mechanism

2)1. Exploded view of automatic winding mechanism (Fig. 1)

2)2. Action of automatic winding mechanism

Fig. 2 shows structure of the automatic winding mechanism. The oscillating weight is freely rotated right and left by slight movement of the arm, and its rotating torque is simultaneously transmitted to the first and second locking upper wheels of the first and second locking wheels by the oscillating weight pinion.

However, there are devices between the locking upper and lower wheels of the first and second locking wheels to transmit rotation in one direction only (refer to page 3); consequently, the first locking wheel and second locking wheel - transmit rotations in opposite directions.

As the result, although the oscillating weight rotates in any direction, the transmission wheel always rotates in the direction of winding the mainspring by action of the first or second locking wheel.

Fig. 3 shows transmission of rotation from the oscillating weight to the barrel.

As viewed from the case back, when the oscillating weight is rotated clockwise, the first and second locking upper wheels are rotated counterclockwise by the oscillating weight pinion. However, on the first

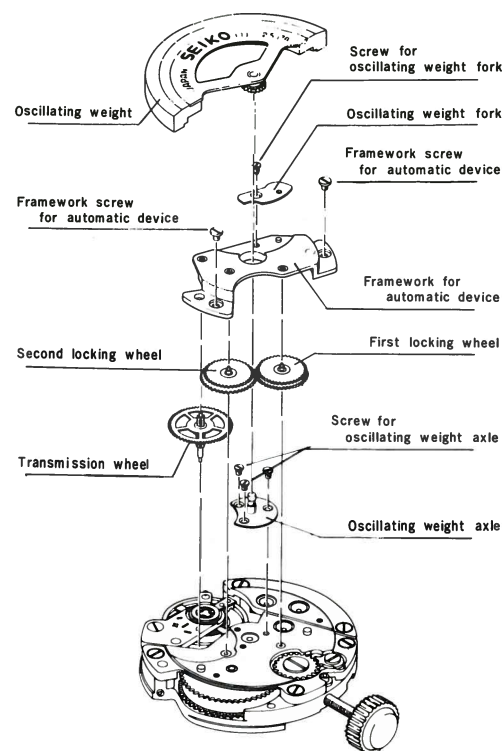


Fig. 1

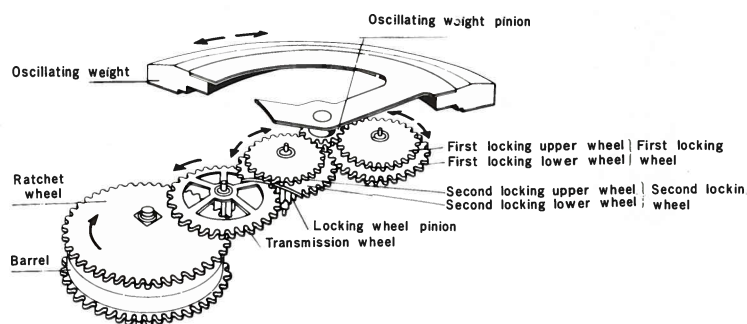


Fig. 2 Structure of Automatic Winding Gear Train

locking wheel, counterclockwise rotation of the upper wheel is also transmitted to the lower wheel by actions of the locking pawl and the locking ratchet wheel (both upper and lower wheels rotate together). This time, on the second locking wheel, the second locking upper wheel rotates counterclockwise (the locking pawl and the locking ratchet wheel do not operate), and the second locking upper and lower wheels rotate in opposite directions. That is, since the first locking lower wheel and the second locking lower wheel are interlocked, if the first locking lower wheel rotates counterclockwise, the second locking lower wheel rotates clockwise. Consequently, the upper wheel and lower wheel on the second locking wheel rotate in opposite directions. On the other hand, when the oscillating weight is rotated counterclockwise, the first and second locking upper wheels rotate clockwise. However, this time, the locking pawl and the locking ratchet wheel of the first locking wheel side do not move, but they move on the second locking wheel side. That is, the second locking lower wheel rotates clockwise together with the second locking upper wheel; however, on the first locking wheel, the upper and lower wheels rotate in opposite directions. Concerning this point, confirm that the first and second locking lower wheels rotate in a predetermined direction, although the oscillating weight rotates in any direction. In other words, right and left rotations are regulated, and this rotation is transmitted to the mainspring through the transmission wheel.

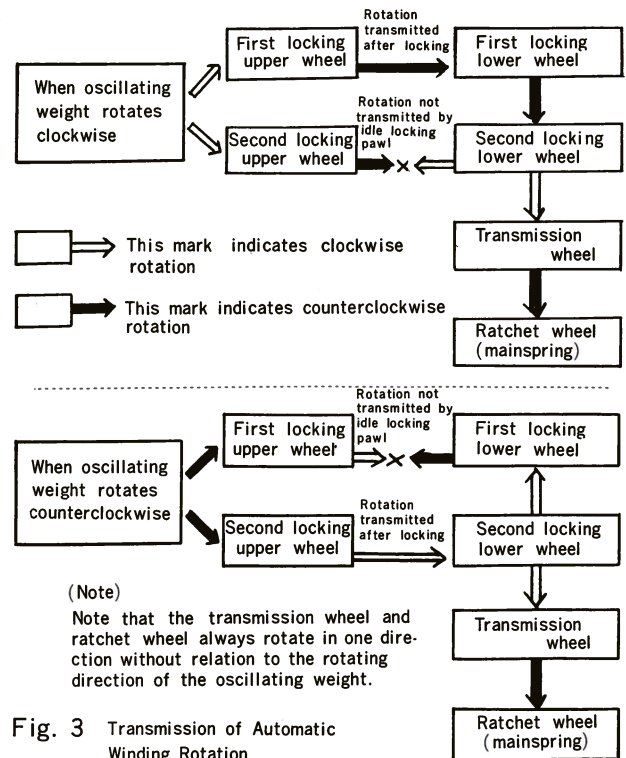


Fig. 3 Transmission of Automatic Winding Rotation

2)-3 Action of locking wheel

The locking pawl and ratchet wheel of the locking wheel (a device that transmits rotation in only one direction) is constructed as shown in Fig. 4. (Fig. 4 shows the first locking wheel; in the second locking wheel, directions of the pawl and pawl ends of the ratchet wheel are reversed).

In the drawing, the ratchet wheel is secured to the first locking upper wheel, and when it is rotated by the oscillating weight, either the ratchet wheel hooks on the pawl end of the locking pawl or the pawl end escapes from the ratchet wheel (according to the direction of rotation).

When the locking upper wheel (ratchet wheel) rotates in the direction that it hooks the pawl end of the locking pawl, the locking lower wheel rotates through the locking pawl (i.e., pin). This time, natural rotation of the oscillating weight is transmitted.

When the locking upper wheel rotates in the direction that springs the pawl end of the locking pawl, rotation is not transmitted to the locking lower wheel even though the locking upper wheel rotates. Since the transmission has the above-mentioned mechanism, hold the locking wheel with a pair of tweezers (as shown in Fig. 5) while turning the locking upper wheel with the bristles of a soft brush so that this device can be checked.

First locking wheel

When turning clockwise.....
It turns smoothly :
that is, idle turning.

When turning counterclockwise.....
It moves slightly and stops immediately
(refer to note) ;
that is, locked.

Second locking wheel

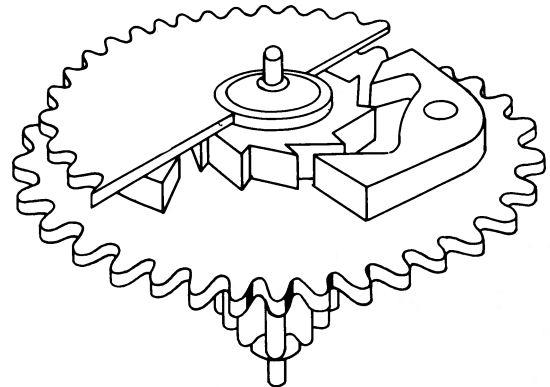
When turning clockwise...It is locked.
When turning counterclockwise.....
It becomes idle.

As a general rule, locking wheels should turn smoothly while idling and function correctly when locking.

First locking wheel and second locking wheel can be discriminated by sizes and finish of pinions (as shown in Fig. 5) and also by observing the directions of idling and locking.

(Note) When turning the locking wheel in the locking direction, the locking upper wheels rotate slightly until they lock—this action is called the play of locking wheels. This play is approximately 30° in general. Concerning this play, smaller play results in better efficiency.

Structure of (first) locking wheel



(Note) Regarding the second locking wheel, directions of locking pawl and ratchet wheel are reversed.

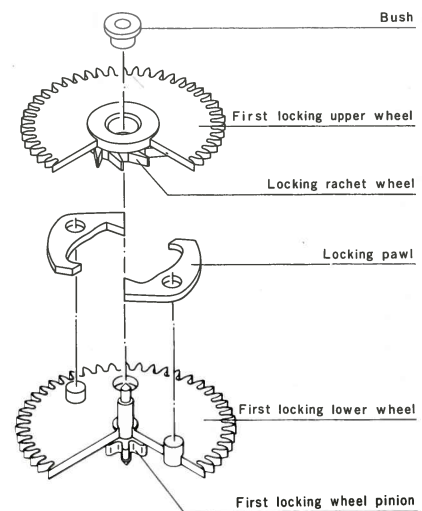


Fig. 4

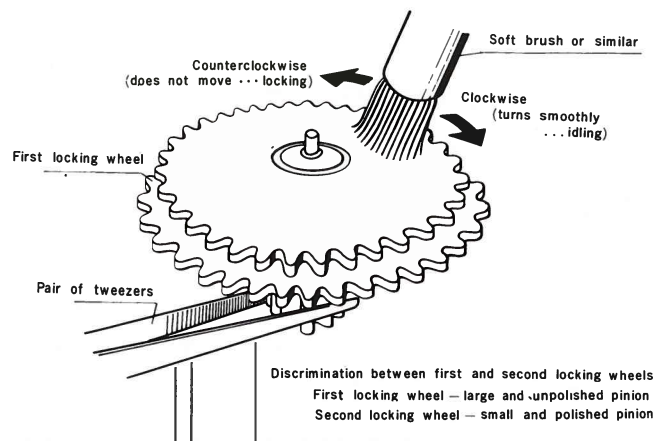


Fig. 5 Action of (First) Locking Wheel

3) Calendar mechanism and hand setting mechanism

3)-1 Exploded view of calendar mechanism (Fig. 6)

3)-2 Action of instant date setting mechanism

The crown has a three position change-over mechanism. When the crown is pushed back to the second position after it is pulled out to the third position, the date is easily advanced by one day.

First position..... Winding the mainspring

Second position..... Hand setting

Third position..... Date setting (when pushed back to the second position, the date is driven one day)

A. Structure

Fig. 7 illustrates the principal parts. The following four parts are the principals which constitute the instant date setting device.

- Date corrector
- Date corrector spring
- Date corrector finger
- Date corrector finger spring

The date corrector is installed on the yoke (clutch lever) coaxially. The date corrector spring springs the date corrector when the crown is pushed back to the second position from the third position, but usually it is pushing the date corrector to the plate so that the date corrector strikes the plate feet pipe (pin a). The date corrector finger, installed on the date corrector, is always pressed in one direction by action of the date corrector finger spring.

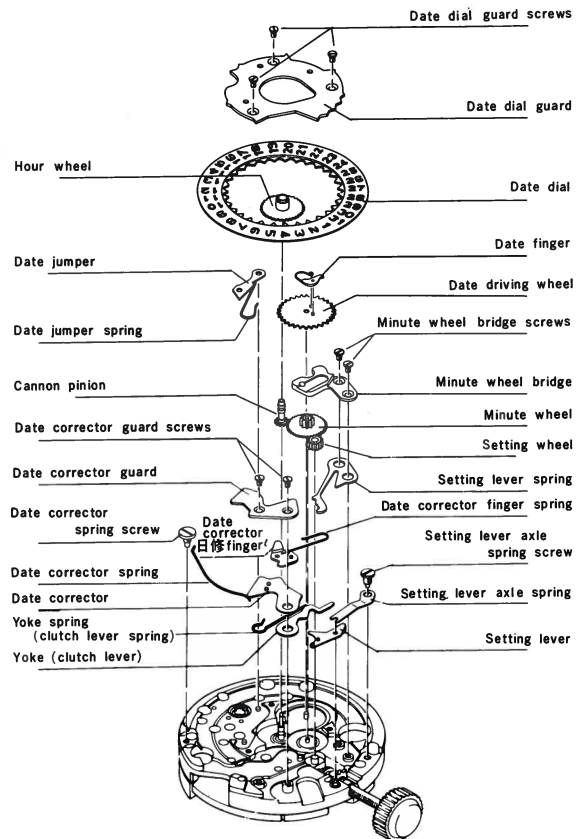


Fig. 6

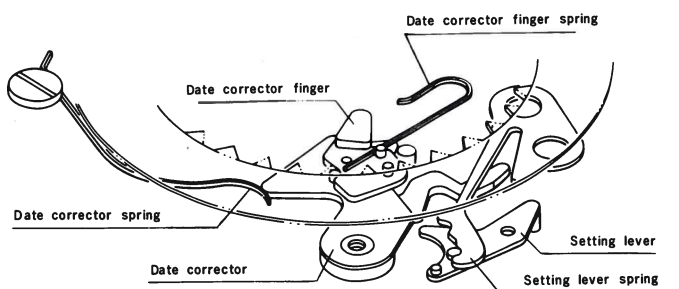


Fig. 7

B. Action

First and second positions

Fig. 8 shows conditions when the crown is in the first and second positions. As mentioned above, the mainspring is wound in the first position and hand setting is performed in the second position; therefore, these conditions have no relation to action of the date corrector or parts of the date correcting mechanism. That is, the date corrector is operated by pushing force of the setting lever: however, in this condition, the setting lever does not strike the date corrector.

Third position

Fig. 9 shows the condition when the crown is in the third position. When pulling out the crown to the third position, the date corrector is operated by pushing force of the setting lever axle (note that the date corrector shifts as compared with Fig. 8).

By operation of the date corrector, also the date corrector finger is moved. In this action, the date corrector screw (pin b) attached on the date corrector finger contacts the teeth of the date dial and separates. This is due to the rotating shift of the date corrector finger centering the pin c (standing on the date corrector) thus, the date corrector screw (pin b) surmounts the teeth of the date dial without reversing the teeth by action of the date corrector finger spring. This is the completing condition of the date correction preparation (the above are actions of crown 1-2-3 positions)

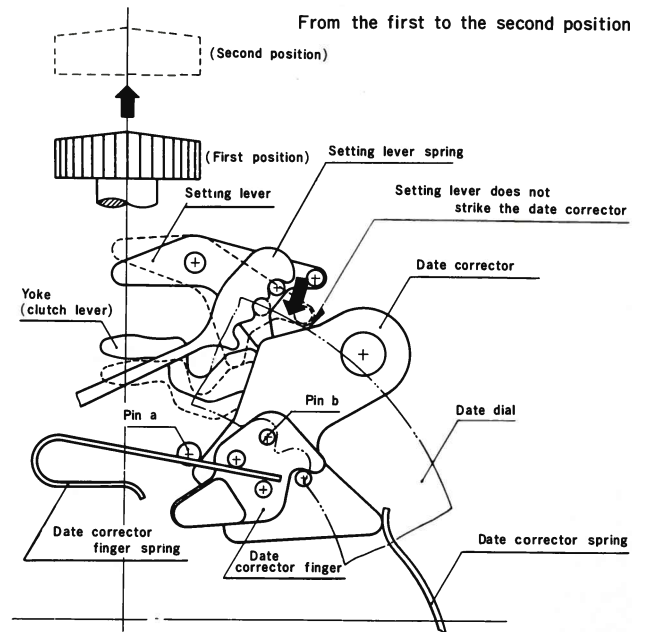


Fig. 8

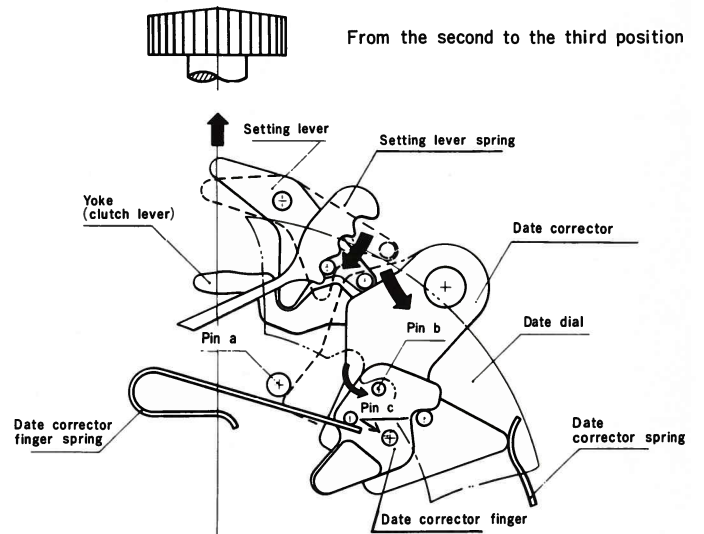


Fig. 9

When the crown is pushed back to the second position from third position, the date corrector and the date corrector finger are returned to their previous condition (shown in Fig. 8) by force of the date corrector spring. This time, the date corrector screw (pin b) advances the teeth of the date dial, forwarding the date dial one day.

The date corrector screw (pin b) attached to the date corrector selects a different route when it is from the second position to third position and from the third position to second position. Note this action which is shown in Fig. 10.

4) Movement

4)-1 Exploded view of the force transmission mechanism Fig. 11

4)-2 Action of the gear train mechanism Fig. 12

The feature of this movement is the sweep second hand system, called a go-and-back sweep second hand system. There are two third wheels and a third pinion.

The force is transmitted to the sweep second pinion from the upper third wheel secured to the third wheel pinion, then transmitted to the fourth wheel pinion through the lower third wheel from the sweep second pinion.

As shown in Fig. 13, this lower third wheel is not secured to the third wheel pinion; thus, it rotates smoothly separated from the pinion. That is, the force is transmitted reciprocally between the upper and lower third wheels and the second pinion. Consequently, this is called the go-and-back sweep second hand system. Then, the sweep second pinion also lies in the flow of force transmission; therefore,

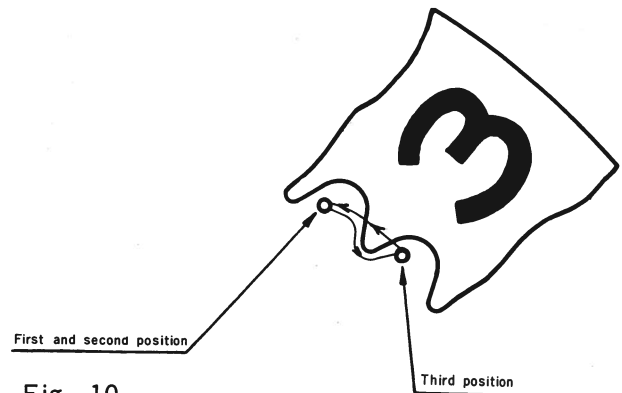


Fig. 10

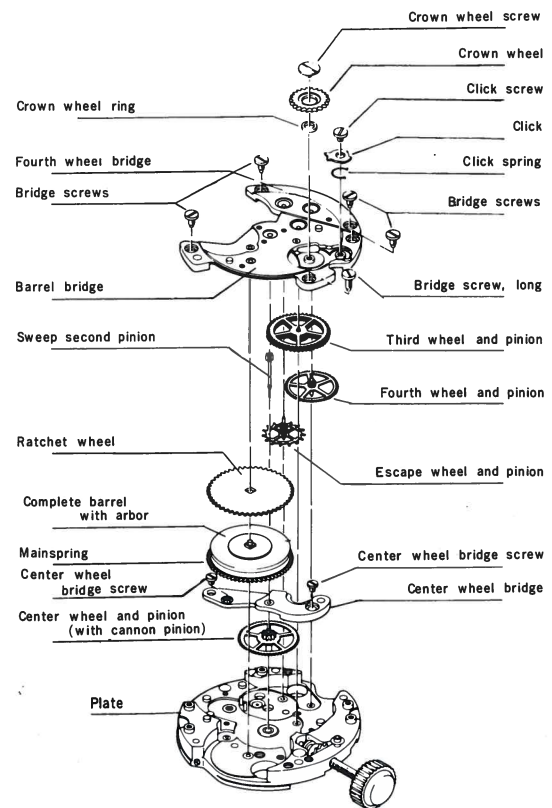


Fig. 11 Force Transmission Mechanism

this mechanism does not require any friction spring for sweep second pinion, the same as in the indirect sweep-second hand system.

4)-3 Exploded view of escapement and regulator mechanisms (Fig. 14)

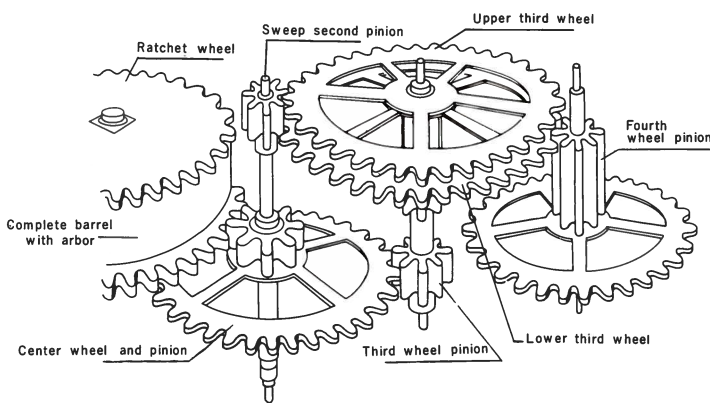
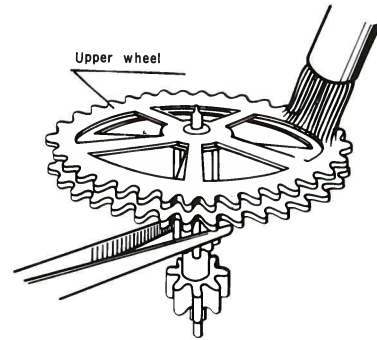
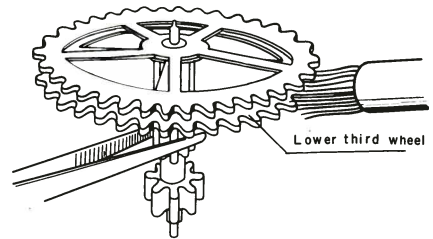


Fig. 12



Turn the upper wheel while holding the pinion with a pair of tweezers
Does not turn.



Turn the lower wheel while holding the pinion with a pair of tweezers
Turns smoothly.

Fig. 13

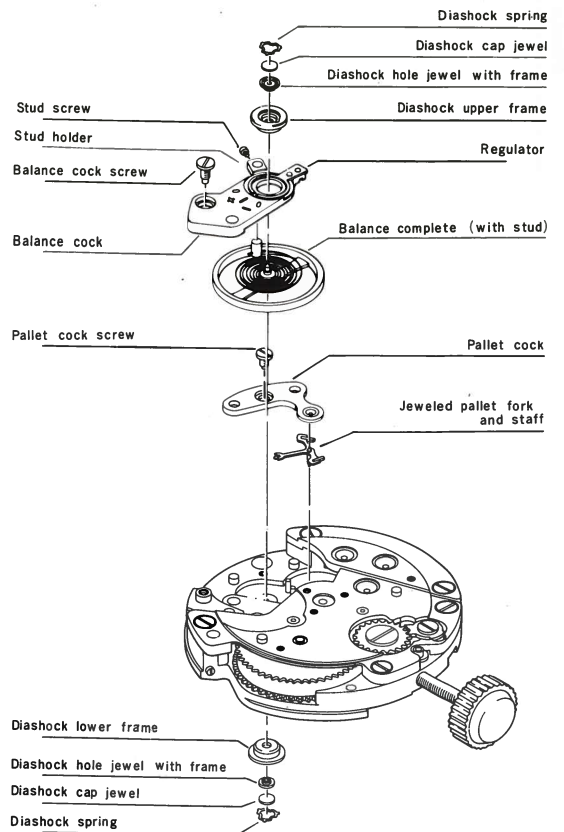
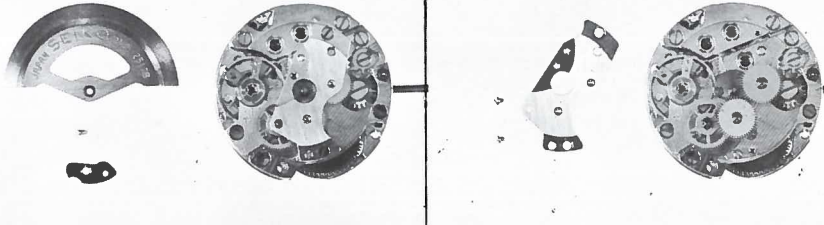
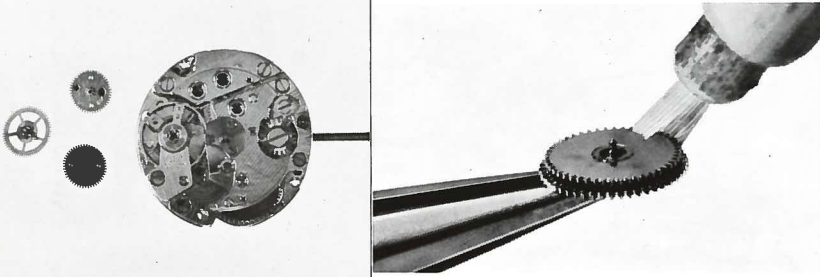


Fig. 14

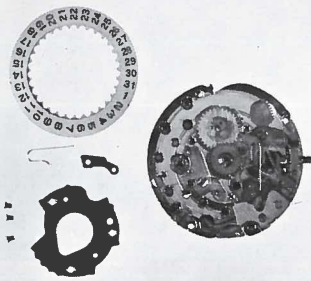
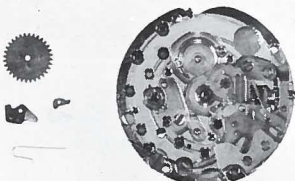
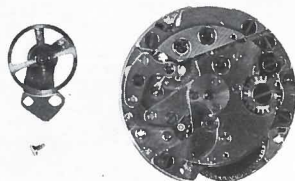
2517B Disassembly and assembly—continued

Disassembly	Method	1	OSCILLATING WEIGHT	2	
	Remark	<ol style="list-style-type: none"> 1) Remove screw for oscillating weight fork 2) Remove oscillating weight fork 3) Remove oscillating weight <p>Check height of oscillating weight from surface of plate before removing it and confirm that oscillating weight does not touch the plate or case back. When removing oscillating weight in a condition that force of mainspring is left applied, sometimes the jewel may be broken. Disassembly should be started after teeth of the click and crown wheel are interlocked.</p>			FRAMEWORK FOR AUTOMATIC DEVICE
Assembly	Method	19	CONFIRMATION OF OSCILLATING WEIGHT ROTATING CONDITION	17	
	Remark	<ol style="list-style-type: none"> 1) Wind crown slowly after placing movement horizontally, facing oscillating weight upward 2) Then, confirm whether or not oscillating weight rotates (escape checking); if it rotates, then escaping is defective. 3) When mainspring is considerably wound, turn the oscillating weight by approximately 90° several times with a finger, then release oscillating weight and check reversing angle (lock checking). 4) Fully wind and place movement vertically; rotate the movement slowly to check whether or not oscillating weight rotates together with movement. (following rotation check) <p>When oscillating weight rotates in case above, this indicates defective escaping of locking wheel, requiring cleaning. Reversely rotating over 90° indicates defective locking of the locking wheel, requiring replacing. If oscillating weight rotates together with movement, check escapement of locking wheel, and height and end shake of oscillating weight.</p>			FRAMEWORK FOR AUTOMATIC DEVICE
	Photo			18	
	Method	18	OSCILLATING WEIGHT	17	
	Remark	<ol style="list-style-type: none"> 1) Lubricate oscillating weight axle (watch oil S-4 or Moebius grease "Remontoires") 2) Set oscillating weight 3) Lubricate a portion of oscillating weight fork where it contacts the oscillating weight (watch oil S-4 or Moebius grease "Remontoires") 4) Set oscillating weight fork on framework for automatic device and fasten its screw 5) Fasten screw for oscillating weight 6) Check for end shake and height of oscillating weight <p>Height of oscillating weight is satisfactorily positioned when the clearance with framework is between minimum 0.2mm and maximum 0.4mm.</p>			FRAMEWORK FOR AUTOMATIC DEVICE
		<ol style="list-style-type: none"> 1) Set framework for automatic device 2) Fasten framework screws for automatic device (2 pcs) 3) Check end shakes of first and second locking wheel 4) Lubricate upper pivot of transmission wheel (watch oil S-4) <p>When tightening framework screws for automatic device, do so after confirming correct interlock of locking wheel and locking wheel pivot. Correctly lubricate upper pivot with only a small quantity of oil.</p>			

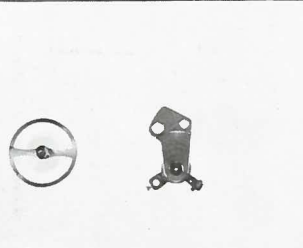
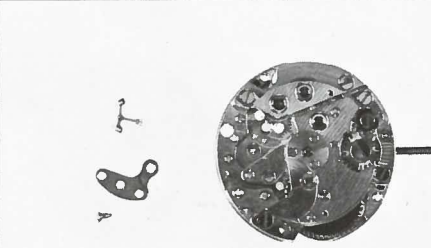
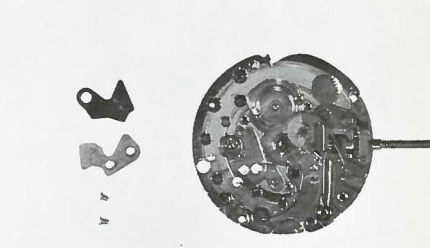
2517B Disassembly and assembly—continued

Disassembly	3	LOCKING WHEEL AND TRANSMISSION WHEEL		
	Method	<ol style="list-style-type: none"> 1) Remove second locking wheel 2) Remove first locking wheel 3) Remove transmission wheel 		
	Remark	<p>Discriminating features of differential wheels are—</p> <p>Outer diameter of pinion is large and teeth are thin...First locking wheel</p> <p>Outer diameter of pinion is small and teeth are thick...Second locking wheel</p>		
Photo				
Assembly	16	LOCKING WHEEL AND TRANSMISSION WHEEL	15	14
	Method	<ol style="list-style-type: none"> 1) Set transmission wheel 2) Lubricate upper and lower pivots of first and second locking wheels (Moebius Synt-A-Lube) 3) Set first locking wheel 4) Set second locking wheel 	CHECK OF LOCKING WHEEL	LUBRICATION
Remark	Set second locking wheel on the nearer portion to transmission wheel.	<p>Check escaping and locking conditions of locking wheel by turning it with a very soft paint brush while holding the locking wheel pinion with tweezers.</p> <p>As shown in above photo, when checking escape of locking wheel, turn locking upper wheel in escape direction with a small paint brush while holding pinion with tweezers. If rotation is sluggish, escape is defective. Concerning the direction of escape, first locking wheel is right rotation (clockwise) and second locking wheel is left rotation (counterclockwise). (For the locking test, turn locking wheel in reverse direction. If it turns reversely above 45°, this is defective locking.)</p>	Refer to p. 2517-14	

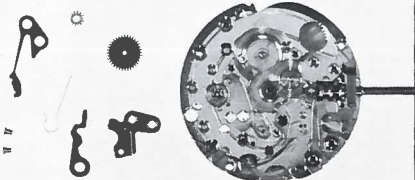
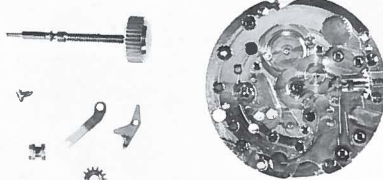
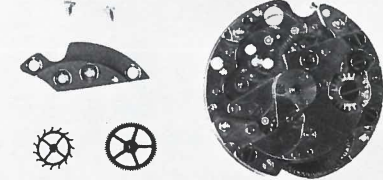
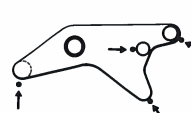
2517B Disassembly and assembly—continued

Disassembly	4	DATE DIAL GUARD DATE JUMPER	6	
	<ol style="list-style-type: none"> 1) Remove date dial guard screws (3 pcs) 2) Remove date dial guard 3) Remove date jumper 4) Remove date dial 5) Remove date jumper spring 		<ol style="list-style-type: none"> 1) Unwind mainspring 2) Remove balance cock screw 3) Remove balance cock 	
	<p>When removing date dial, pay attention to date jumper spring because it easily leaps off.</p>		<p>When detaching date finger spring, pay attention to avoid bending the spring welded portion while holding it up. Also handle the date corrector finger spring carefully because it springs up easily. Since the date jumper spring and date corrector finger spring are similar size and shaped, previously confirm their shapes.</p>	
Photo				
Assembly	13	DATE DIAL GUARD DATE JUMPER	11	
	<ol style="list-style-type: none"> 1) Set date jumper spring 2) Set date dial 3) Set date jumper 4) Set date dial guard 5) Fasten date dial guard screws (3 pcs) 6) Lubricate on the side cannon pinion (watch oil S-4 or Moebius grease "Remontoires") 7) Set hour wheel 8) Make test run of date dial (5 rotations) 9) Check for date driving and date correcting conditions 		<ol style="list-style-type: none"> 1) Set date corrector finger 2) Set date corrector finger spring 3) Lubricate tube for date driving wheel screw (Moebius Synt-A-Lube) 4) Set date driving wheel 5) Set date finger 	
	<p>Inspect for dust on date dial guard and date dial guide portion of plate. When change of date dial is defective, apply a small quantity of Moebius Synt-A-Lube to contacting side surface of date jumper. Never allow height of date dial guard screw to project above date dial guard.</p>		<p>Correctly insert date corrector finger spring into recessed portion of minute wheel bridge; further, make sure not to confuse with date jumper spring. Carefully assemble date finger to prevent deforming it.</p>	
Remark			<p>Before removing balance cock, confirm state of playing of hairspring between regulator key stud and pin portion to be realized while assembling. When removing the balance cock with balance, be careful not to deform shape of hairspring.</p>	
				
			<p>Do not change the condition of hairspring and shape of hairspring.</p>	

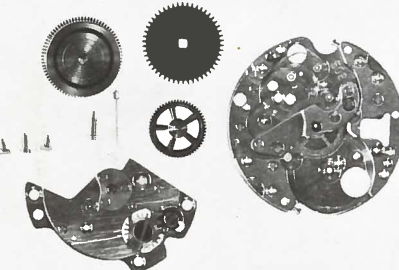
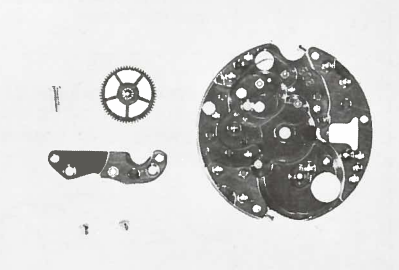
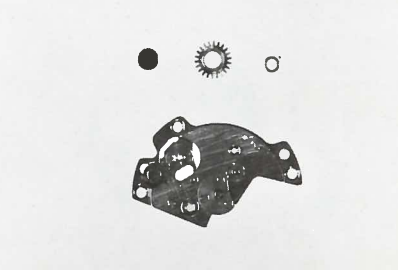
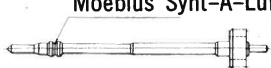
2517B Disassembly and assembly—continued

	7	8	9
Disassembly	BALANCE	JEWELLED PALLET FORK & STAFF	DATE CORRECTOR
Method	<ol style="list-style-type: none"> 1) Remove stud after loosening stud screw 2) Remove balance by turning regulator key with driver 	<ol style="list-style-type: none"> 1) Remove pallet cock screw 2) Remove pallet cock 3) Remove pallet 	<ol style="list-style-type: none"> 1) Remove date corrector guard screws (2 pcs) 2) Remove date corrector guard 3) Remove date corrector
Remark	Pay attention not to deform shape of hairspring.		Do not remove date corrector spring and date corrector spring screw.
Photo			
Assembly	10	9	8
Method	<ol style="list-style-type: none"> 1) Check shape of hairspring 2) Place balance on balance cock 3) Insert hairspring between regulator key and regulator pin, and insert stud into stud holder 4) Turn regulator key 5) Fasten stud screw 	<ol style="list-style-type: none"> 1) Lubricate jeweled pallet fork (Moebius Synt-A-Lube) 2) Set pallet and cock 3) Fasten pallet cock screw 4) Lubricate pallet upper and lower pivots 5) Confirm engaging degree of pallet jewel 	<ol style="list-style-type: none"> 1) Set date corrector 2) Set date corrector guard 3) Fasten date corrector guard screws (2 pcs) 4) Check for date corrector end shake and its action
Remark	When inserting stud into stud holder and inserting hairspring between regulator key and regulator pin, make sure not to deform shape of hairspring.	Engagement of jeweled pallet fork should be 1/4-1/5 of jewel width for the first lock and approximately 1/2 of the first lock quantity for the second lock.	When date corrector shows defective action, sometimes it is due to improper lubrication of setting lever, so carefully check it.

2517B Disassembly and assembly—continued

	10	11	12
Disassembly	YOKE (CLUTCH LEVER) AND MINUTE WHEEL	WINDING STEM AND SETTING LEVER	FOURTH WHEEL BRIDGE
Method	<ol style="list-style-type: none"> 1) Remove minute wheel bridge screw (2 pcs) 2) Remove minute wheel bridge 3) Remove setting lever spring 4) Remove minute wheel and setting wheel 5) Remove yoke spring (clutch lever spring) and yoke (clutch lever) 	<ol style="list-style-type: none"> 1) Remove setting lever axle spring screw 2) Remove setting lever axle spring 3) Remove setting lever 4) Remove winding stem 5) Remove clutch wheel and winding wheel 	<ol style="list-style-type: none"> 1) Remove fourth wheel bridge screws (2 pcs) 2) Remove fourth wheel bridge 3) Remove fourth wheel and pinion 4) Remove escape wheel and pinion
Remark	Be careful not to deform yoke spring.		
Photo			
Assembly	7	6	5
Method	<ol style="list-style-type: none"> 1) Set yoke, clutch lever spring 2) Set setting wheel and minute wheel 3) Set setting lever spring 4) Set minute wheel bridge 5) Fasten minute wheel bridge screw (2 pcs) 6) Check for end shake of minute wheel and conditions of crown extracting and depressing 7) Check for conditions of free running and hand setting 	<ol style="list-style-type: none"> 1) Set winding wheel and clutch wheel 2) Set winding stem after lubricating it (watch oil S-4 or Moebius grease "Remontoires") 3) Set setting lever 4) Set setting lever axle spring 5) Fasten setting lever axle spring screw 6) Lubricate tube for yoke, setting lever, winding wheel, clutch wheel, setting wheel, and tube for minute wheel pin (watch oil S-4 or Moebius grease "Remontoires") 	<ol style="list-style-type: none"> 1) Set escape wheel and pinion after lubricating upper and lower pivots (Moebius Synt-A-Lube) 2) Set fourth wheel and pinion after lubricating upper and lower pivots (Moebius Synt-A-Lube) 3) Set fourth wheel bridge 4) Fasten fourth wheel bridge screws (2 pcs) 5) Check for end shake and rotating condition of each wheel
Remark	Do not adjust to heavy hand setting (make the turn smoothly by suitable pinion folding)	Lubricating portions of setting lever are as follows. 	When rotating condition is not smooth on any wheel, recheck for oil quantity and end shake.

2517B Disassembly and assembly—continued

	13	14	15
Disassembly	BARREL BRIDGE	TRAIN-WHEEL BRIDGE	CROWN WHEEL
	<ol style="list-style-type: none"> 1) Remove barrel bridge screws (2 pcs) and bridge screw, long (1 pce.) 2) Remove barrel bridge 3) Remove setting lever axle 4) Remove ratchet wheel 5) Remove complete barrel with arbor 6) Remove third wheel and pinion 7) Remove sweep second pinion 	<ol style="list-style-type: none"> 1) Remove cannon pinion 2) Center wheel bridge screw (2 pcs) 3) Remove center wheel bridge 4) Remove center wheel and pinion 	<ol style="list-style-type: none"> 1) Remove crown wheel screw 2) Remove crown wheel 3) Remove crown wheel ring
	It is not necessary to remove oscillating weight axle.	Pull out cannon pinion vertically. If it is pulled out on an inclined position, occasionally the center wheel arbor may bend or break.	Crown wheel screw is a left-handed screw. Do not remove click.
Photo			
Assembly	4	3	2
	BARREL BRIDGE	TRAIN-WHEEL BRIDGE	CROWN WHEEL
Method	<ol style="list-style-type: none"> 1) Lubricate sweep second pinion and set it (Moebius Synt-A-Lube) 2) Set third wheel and pinion after lubricating upper and lower pivots (watch oil S-4) 3) Set complete barrel with arbor after lubricating upper and lower pivots (watch oil S-4 or Moebius grease "Remontoires") 4) Set ratchet wheel 5) Set setting lever axle 6) Set barrel bridge 7) Tighten barrel bridge screws (3 pcs); one is long screw 8) Check for end shake and inspect rotating condition of each wheel 	<ol style="list-style-type: none"> 1) Set center wheel and pinion after lubricating upper and lower pivots 2) Set center wheel bridge 3) Tighten center wheel bridge screw (2 pcs) 4) Turn over movement and lubricate on lower stem 5) Push in cannon pinion 6) Check for end shake of center wheel and pinion 7) Lubricate the lower hole jewel of transmission wheel 	<ol style="list-style-type: none"> 1) Set crown wheel ring 2) Lubricate on the side of crown wheel ring (watch oil S-4 or Moebius grease "Remontoires") 3) Set crown wheel 4) Tighten crown wheel screw 5) Confirm rotating condition of crown wheel
Remark	<p>Before tightening bridge screws, confirm rotating condition of each wheel.</p> <p style="text-align: center;">Moebius Synt-A-Lube</p> 	<p>Push in cannon pinion vertically. Initially perform lubrication of transmission wheel lower pivot, because this becomes impossible after completing assembly. Lubricate them. (watch oil S-4)</p>	

2517B Disassembly and assembly—continued

Identification of locking wheel and lubrication method

There are three types of I, II and III locking wheels used in the 25-series automatic watch, the lubrication method different for each type.

When repairing watches, the type must be correctly identified to perform appropriate lubrication.

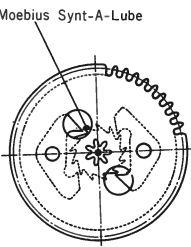
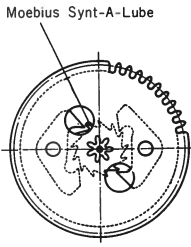
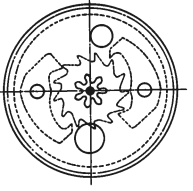
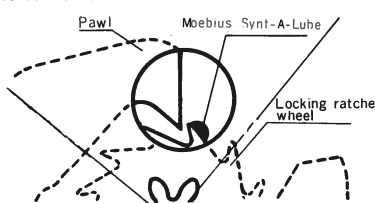
Type Item	I	II	III
Rear-view Shape	 <p style="font-size: small;">Moebius Synt-A-Lube</p> <p style="font-size: x-small;">○ Tip of pawl visible through viewing hole ○ Pivot diameter smaller than type II locking wheel</p>	 <p style="font-size: small;">Moebius Synt-A-Lube</p> <p style="font-size: x-small;">○ Tip of pawl visible through viewing hole ○ Pivot diameter larger than type I locking wheel</p>	 <p style="font-size: x-small;">○ Pawl not visible through viewing hole</p>
Lubrication method	<p>Lubricate ratchet of locking wheel by inserting an oiling stick through pawl viewing hole. (small quantity of Moebius Synt-A-Lube)</p>  <p style="font-size: x-small;">Pawl Moebius Synt-A-Lube Locking ratchet wheel</p>		Lubrication unnecessary
Parts num- ber of	First locking wheel, 667031	First locking wheel, 667032	First locking wheel, 667250
Locking wheel correspond	Second locking wheel, 668031	Second locking wheel, 668032	Second locking wheel, 668250

Table 1 Identification of Locking Wheel and Lubrication Method

16

DIASHOCK

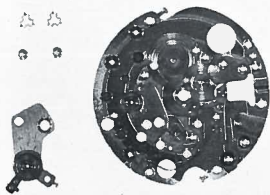
- 1) Detach Diashock spring
- 2) Remove hole jewel with frame left attaching cap jewel

Method

Disassembly

Remark

Photo



1

DIASHOCK

- 1) Place cap jewel with flat surface upward
- 2) Put drop of oil on its center, holding cap jewel with tweezers
- 3) Set Diashock hole jewel with frame over oiled cap jewel

Method

Assembly

Remark

2706A

1) Specifications:

Casing diameter	17.20mm
Height	5.70mm
Vibrations per hour	28,800
Automatic winding (with hand winding mechanism)	
Calendar (day and date; bilingual change-over mechanism for day indication, instant day and date setting device)	

2) Features:

This is a lady's wrist watch with a variety of functions. Up to now, it was considered difficult to provide a lady's wrist watch with various functions due to its small size. However, calibre 2706 has proved this concept to be erroneous.

Stabilized movement:

A lever system is adopted for the automatic winding mechanism. Precision is sufficiently stabilized by a high beat (8 beat); further, auxiliary hand winding mechanism is provided.

Easy-to-use day and date correction:

Day-date correction is simply operated by turning a crown to the right or left after pulling out the crown to the second click. And at the same time, either one of the two languages provided can be chosen to indicate the day of the week.

Easy-to-see calendar:

Letters indicating the day and date are large enough to ensure quick, easy reading.

3) Disassembly and assembly:




Disassemble the watch in the order of Figs. ①—⑦⑩

Assemble by reversing the above order: Figs. ⑦⑩—①




4) Lubrication:

Colored symbols in the illustrated figures indicate the types of oil, the quantity to be applied, and the lubricating points.


Types of oil:

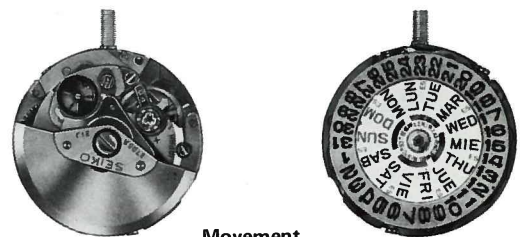
-  Moebius Synt-A-Lube
-  Seiko watch oil S-4
-  Seiko watch oil S-3

Oil quantity:

-  Extremely small quantity
-  Normal quantity
-  Sufficient quantity

As lubricating points other than portions marked with the above symbols are separately indicated, lubricate correctly.

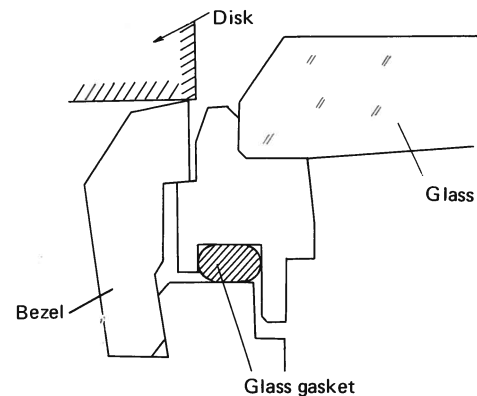
-  Oil must not be applied.



Movement

An example of casing construction

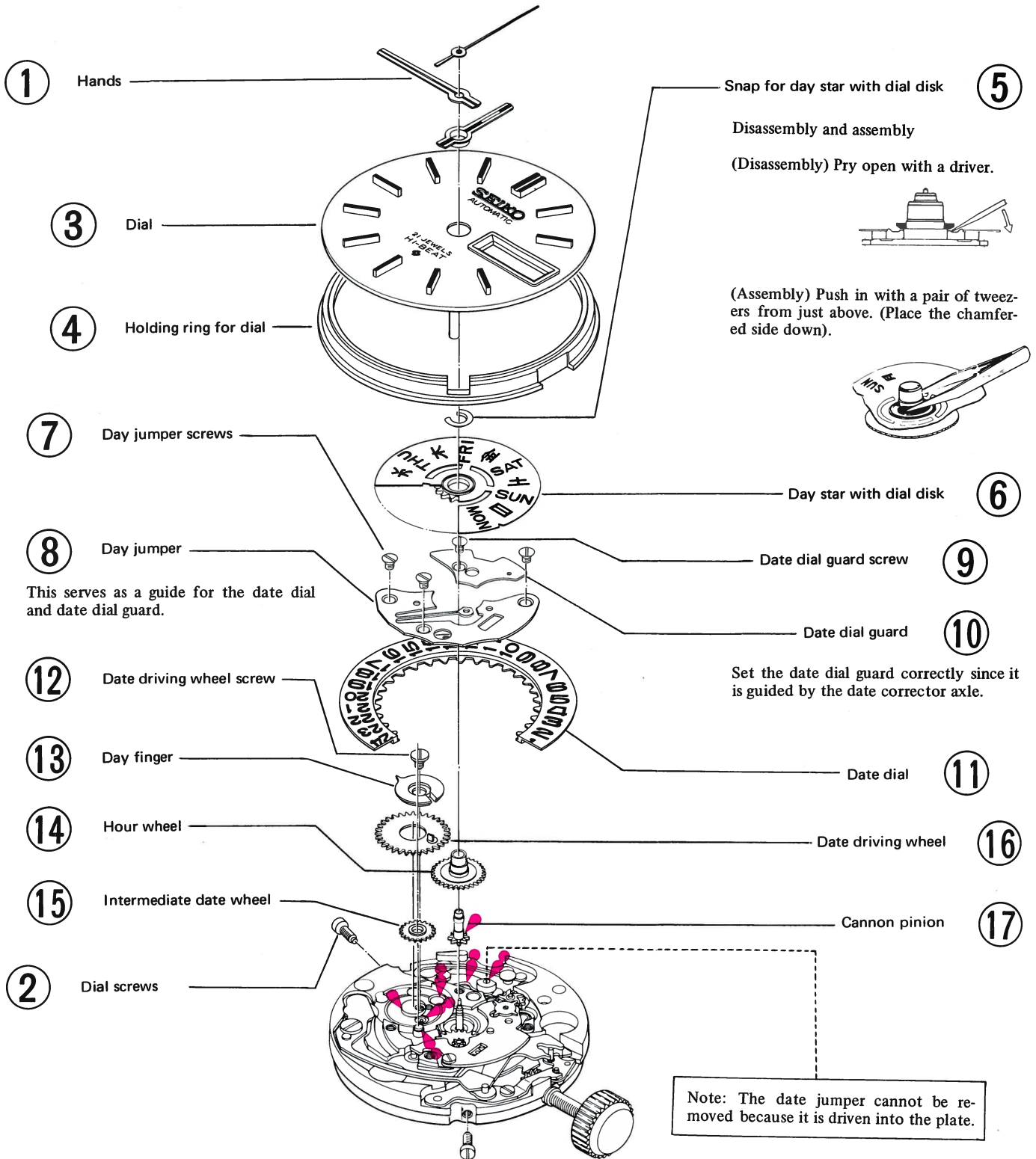
There is a model whose construction has the following glass portion.



Precautions when assembling

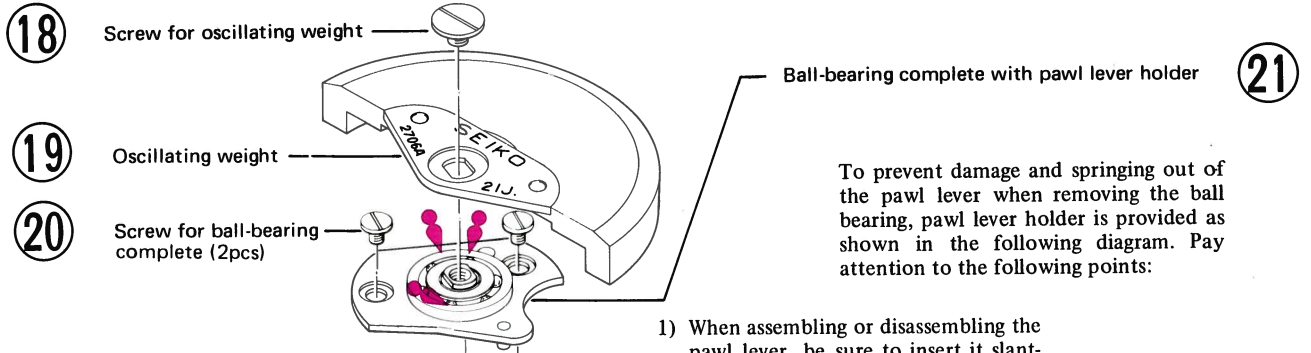
- (1) Insert a gasket into the gasket groove and set the bezel; then push the bezel in.
- (2) Use a disk which does not contact the glass ring when pushing in the bezel by the disk.
- (3) Set the pry opening port on the bezel to its original position.
- (4) It is unnecessary to apply silicone grease to the glass gasket.

2706A Calendar Mechanism



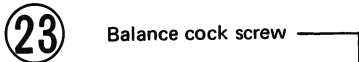
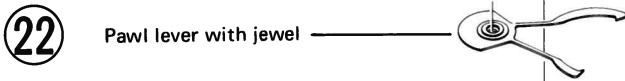
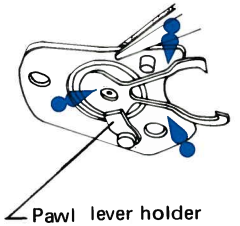
Note: The day and date setting device and bilingual change-over mechanism for day indication will not operate from 8:30 P.M. to 3:30 A.M. since this period is used for day and date driving time.

2706A Automatic Winding, Escapement and Governor Mechanism

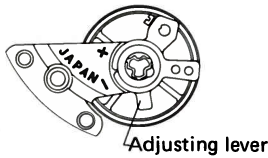


To prevent damage and springing out of the pawl lever when removing the ball bearing, pawl lever holder is provided as shown in the following diagram. Pay attention to the following points:

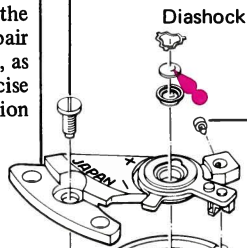
- 1) When assembling or disassembling the pawl lever, be sure to insert it slantwise to prevent it from knocking pawl lever holder.
- 2) Since the pawl lever holder is driven into the ball bearing complete, it cannot be rotated. When it is forcibly rotated or wrenched, it will become deformed and cannot be assembled in the groove of the barrel and train wheel bridge.



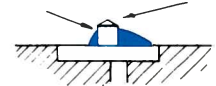
When adjusting out-of-beat, turn the adjusting lever by holding it with a pair of tweezers to revolve the stud holder, as shown in the following diagram. Exercise care not to revolve the stud head portion because it is easily damaged.



Diashock



Never lubricate the top of the eccentric pin.



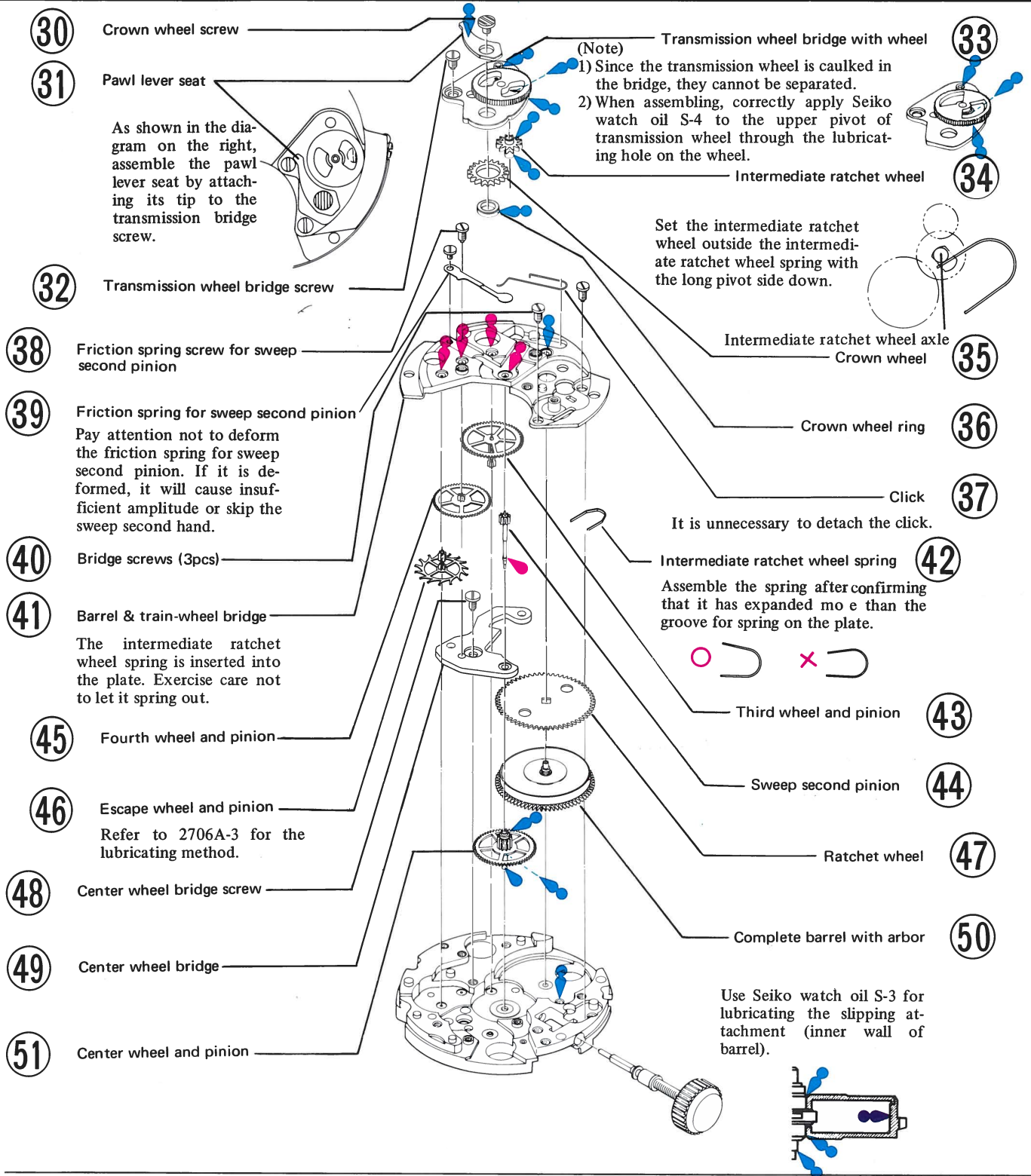
The surface of escape wheel and pinion is coated by special process; therefore, the lubrication method is different from the usual one. Take care of the following two points:
 1. Apply a sufficient quantity of oil to the pallet jewels. No trouble will result if oil flows onto the escape wheel and pinion after assembling.
 2. Never lubricate the impulse surface of the escape wheel.

Shape of the pallet cock is shown in the diagram. When it is necessary to adjust the side shake of banking pin, bend the portion marked.

Exercise care not to damage the pin while adjusting.



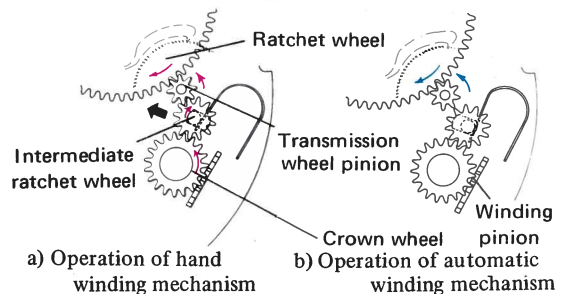
2706A Train Wheel



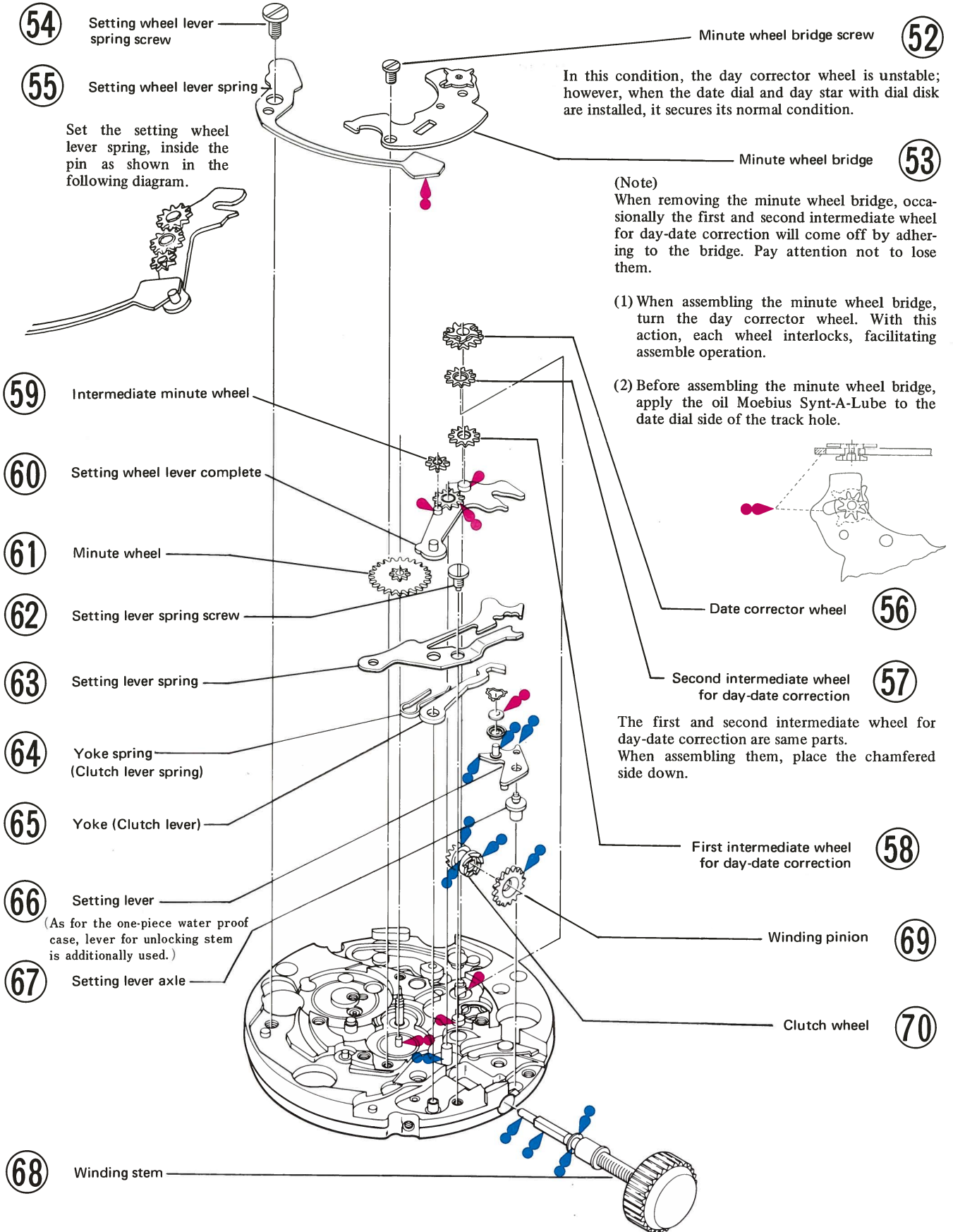
Hand winding mechanism

When turning the crown in its ordinary position, the mainspring is wound by interlocking the intermediate ratchet wheel and the transmission wheel pinion.

When the automatic winding mechanism is operating, the intermediate ratchet wheel detaches from the transmission wheel pinion; thus, the hand winding train wheel does not obstruct winding capability of the automatic winding mechanism.



2706A Setting Mechanism



2706A Setting Mechanism

Crown ordinary position (mainspring winding)

The mainspring can be wound by turning the crown at the position where the winding pinion and clutch wheel interlock.

Fig. 1

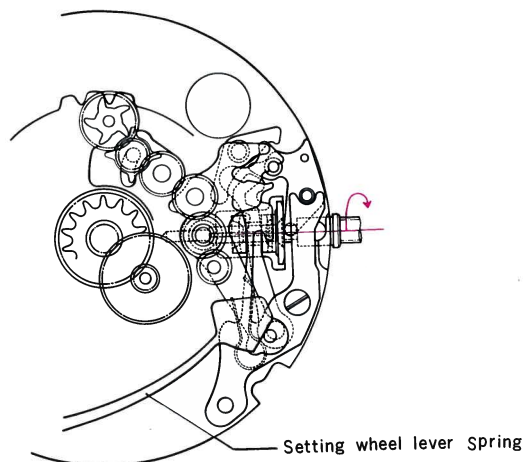


Fig. 1

Position where the crown is pulled out to the second click (setting day and date)

In the condition where the clutch wheel and setting wheel (located under the setting transmission wheel, it rotates together with setting transmission wheel) interlock, when the crown is turned clockwise the day star with dial disk is quickly forwarded. By turning in reverse (counterclockwise), the date dial is quickly forwarded.

Fig. 2

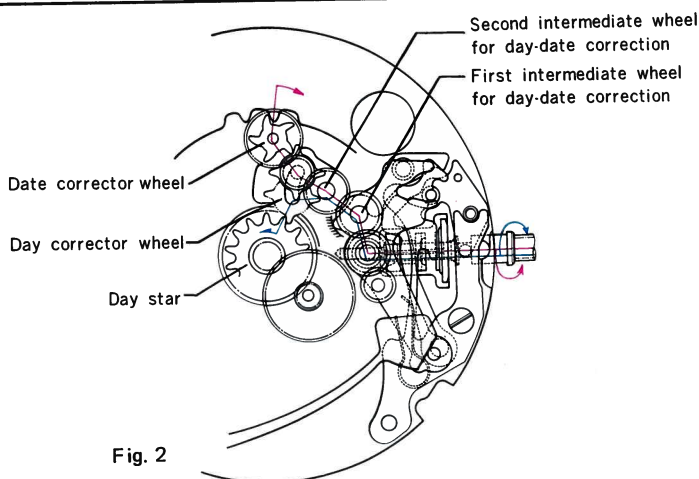


Fig. 2

Position where the crown is pulled out to the third click (setting time)

The intermediate minute wheel interlocks with the minute wheel as a result of the setting wheel lever complete being pushed by the setting lever. When the crown is turned at this position, the hands can be set.

Fig. 3

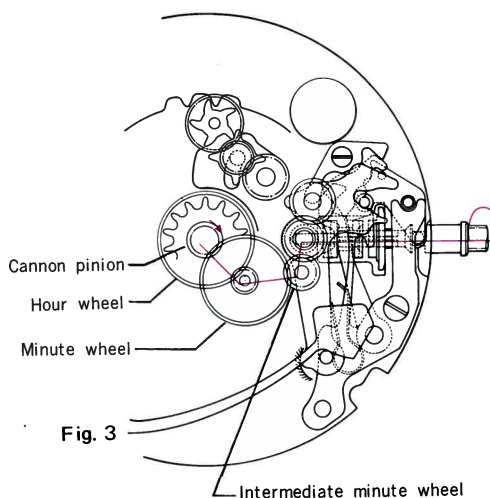
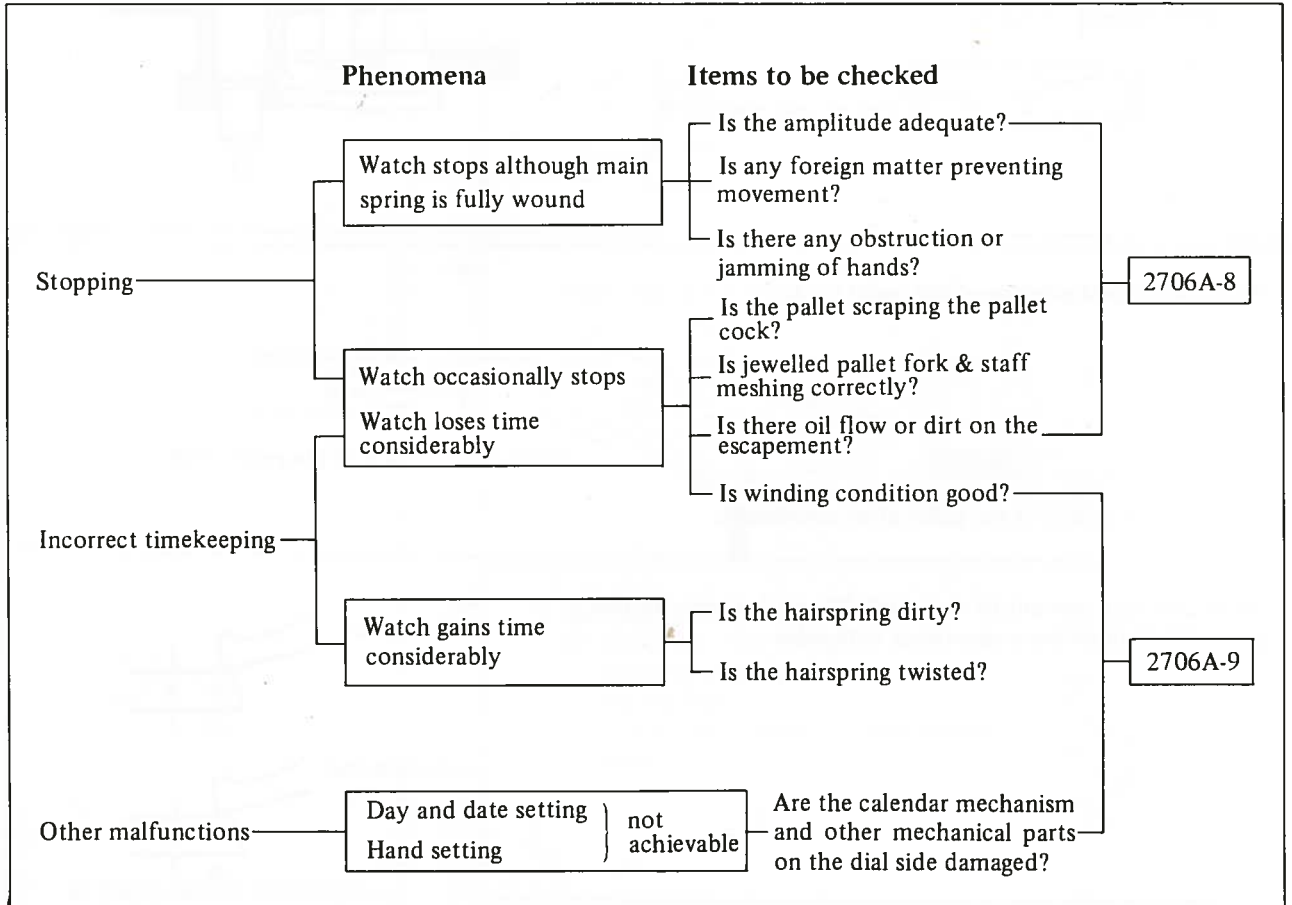


Fig. 3

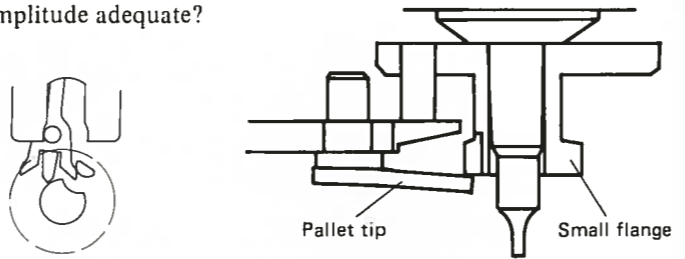
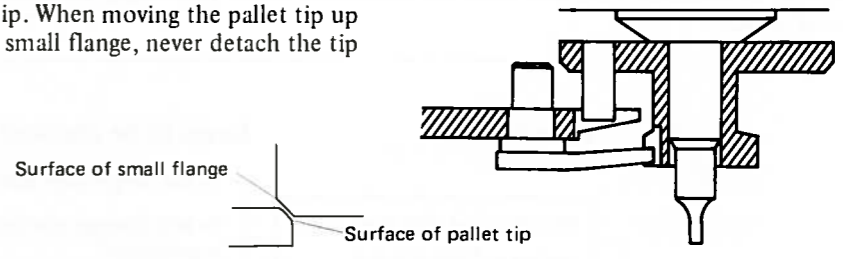
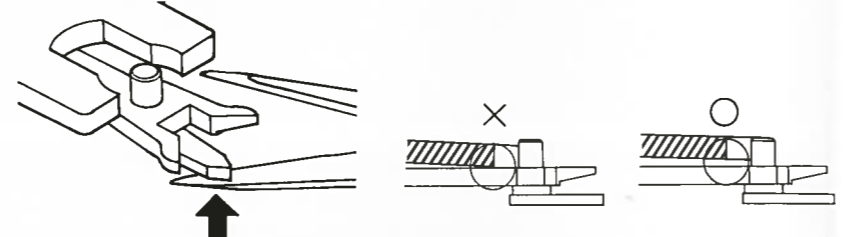
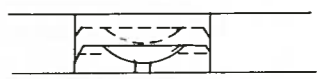
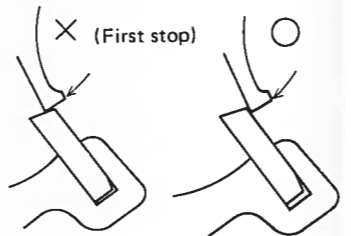
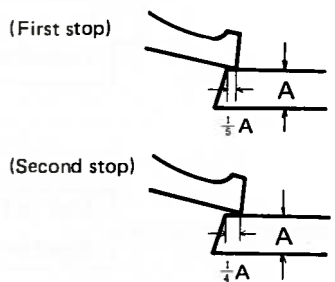
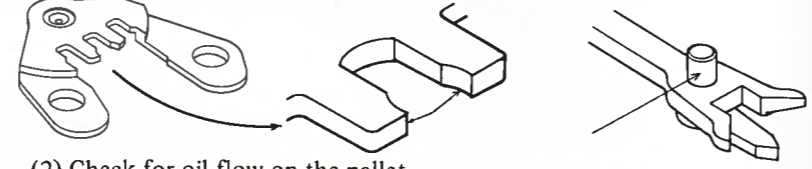

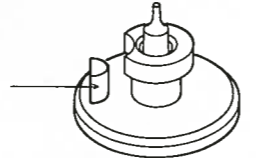
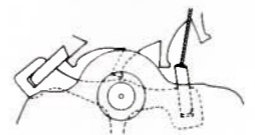
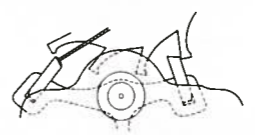
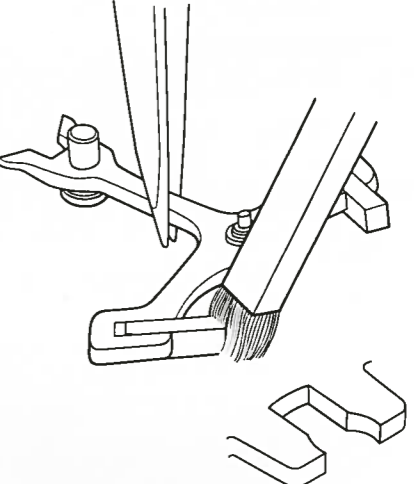
2706A CHECKING AND REPAIRING

When a customer requests that a watch be repaired, the first prerequisite is to inquire on the exact nature of the malfunction.

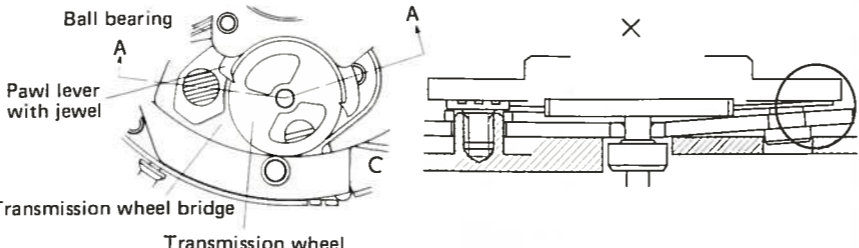

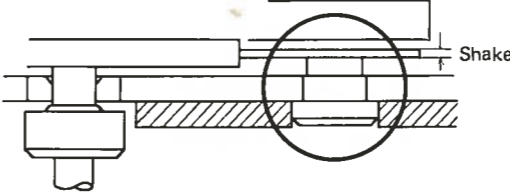
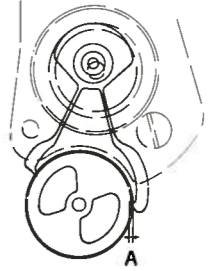

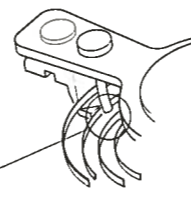
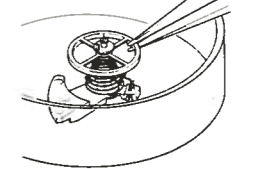
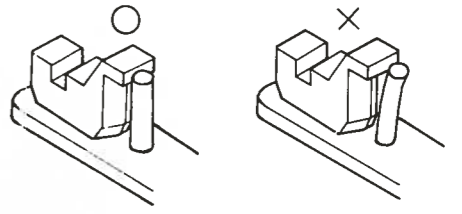
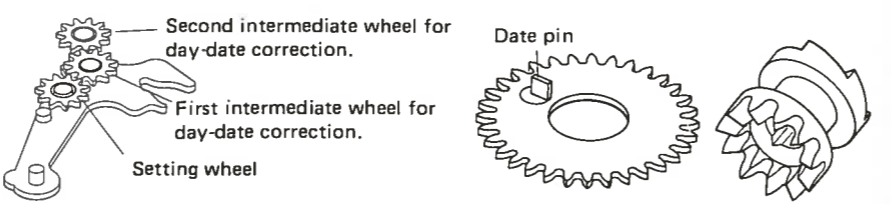
With the information obtained from the customer, check thoroughly (making repairs where necessary) the following points:



2706A CHECKING AND REPAIRING-1

Phenomena	Items to be checked	Repairing Method
<p>1. Watch stops although main-spring is fully wound.</p>	<p>1. Is the amplitude adequate?</p> 	<p>Adjust height of the pallet tip. When moving the pallet tip up and down in examining it and small flange, never detach the tip and small flange.</p> 
	<p>1. When raising the pallet tail, does it rub against the pallet cock?</p> 	<p>Adjust hole jewel position of the pallet cock.</p>  <p>Standardize surface of the pallet cock</p> <p>Always check shakes of the pallet after adjustment.</p>
<p>2. Watch occasionally stops. Watch loses considerably.</p>	<p>2. Any slip on the jewel meshing?</p> <p>(1) With the first stopping does the meshing directly drop on the impact surface?</p> <p>(2) Check each tooth of the escape wheel</p> 	<p>Adjust meshing amount of the jewel. When adjusting one side, always confirm meshing amount of both sides.</p> 
	<p>3. Is there any oil flow or dirt on the escapement?</p> <p>(1) Check for dirt on banking portion of the pallet cock and tip of the pallet</p>  <p>(2) Check for oil flow on the pallet</p>  <p>(3) Check for dirt on roller jewel of the balance</p> 	<p>* Wash the pallet and pallet cock. After washing pallet finger tip, pin portion of pallet tip, and banking portion of pallet cock with a brush, rinse them in benzine. Dry them thoroughly.</p> <p>* After washing and assembling pallet and pallet cock, lubricate the jewel by using an oiling bar or glass oiling injector.</p>  <p>Lubrication of Entry pallet jewel</p>  <p>Lubrication of Exit pallet jewel</p>  <p>* Washing of the balance Wipe the roller jewel well, then rinse it in benzine. Dry it well. (When washing, remove the shock resistant hole jewel with frame).</p>

2706A CHECKING AND REPAIRING-2

Phenomena	Items to be checked	Repairing Method
	<p>4. Is winding condition of the oscillating weight good? The condition is good when the transmission wheel turns round once within 30 revolutions of the oscillating weight. When the winding condition is defective . . .</p> <p>(1) Check on whether the pawl lever with jewel is bent upward or downward. If bent, winding efficiency is lowered as it scratches the transmission wheel bridge.</p> <p>(2) Check on whether the shake of fingers are reduced by a raised transmission wheel bridge.</p>  <p>(3) Check on whether distance between fingers of the pawl lever with jewel is extended and the finger tip is separated from the transmission wheel when winding.</p> 	<p>(1) Correct warp of the pawl lever with jewel</p> <p>(2) Correctly reassemble the transmission wheel bridge</p>  <p>(3) Correct distance between fingers. A = Within double the finger thickness. Adjust with care that distance does not become too narrow.</p> 
3. Watch gains considerably	<p>1. Any dirty portion on the hairspring?</p> <p>Any portion stuck together due to dirt?</p>  <p>2. Is the hairspring twisted? Is the hairspring locked between the regulator key and the stud?</p>  <p>Locked hairspring</p>	<p>Wash the balance.</p> <p>Rinse the balance in fresh benzine and dry it well to prevent the balance coils from touching each other. (When washing, remove shock resistant hole jewel with frame). Refer to next page for details.</p>  <p>After removing the hair spring from twisting, correct bend of the hairspring stud. After correcting, check shape of the hairspring.</p> 
4. Day and date correction Hand setting do not achievable	<p>1. Are the calendar mechanism and other mechanical parts on the dial side damaged? Cracks and loosened setting wheel, first and second intermediate wheel for day-date correction; broken and detached date pin; and broken teeth of clutch wheel.</p>  <p>Second intermediate wheel for day-date correction. First intermediate wheel for day-date correction. Setting wheel Date pin</p>	<p>Replace parts.</p> <p>Day and date change starts from about 8:30 P.M. and finishes about 3:30 A.M. When day and date are corrected within this period, the correcting device will not function; also, it may be damaged, so never correct the day and date during this period. Explain clearly to the customer that he should never do the correcting during this period.</p>

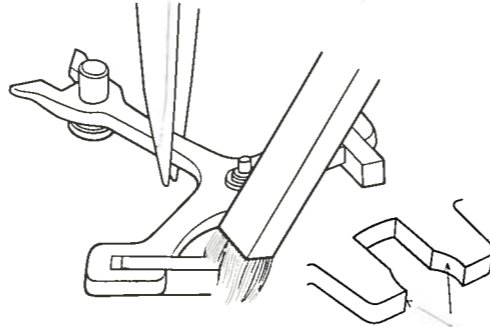
2706A CHECKING AND REPAIRING-3

1. Washing and Lubricating Method for Pallet, Pallet Cock, and Balance

(1) Washing method for pallet and pallet cock

1. Rough washing

Since the pallet has been subjected to a nondiffusion treatment at the factory, ultrasonic washing should be limited to within one minute. When using a brush for washing, only wash the pallet finger tip, pin portion of the pallet tip, and banking portion of the pallet cock.

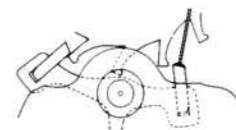


2. Rinsing and drying

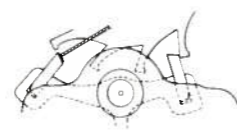
Rinse the pallet and the pallet cock in fresh benzene, and dry them well by using a dryer or other means. Drying temperature should be less than 40°C.

(2) Lubricating jewel

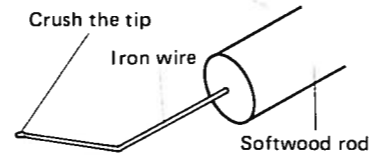
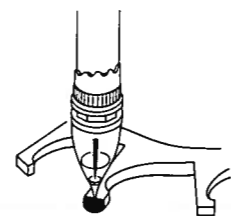
When lubricating the pallet jewel, do so after assembling the pallet and the pallet cock. Using a glass oiling injector or oiling bar, sufficiently lubricate the entry pallet jewel and the exit pallet jewel after allowing the tooth tip of the escape wheel to escape. No problem exists when oil is diffused on the escape wheel.



Lubricating the entry pallet jewel



Lubricating the exit pallet jewel



Crush the tip
Iron wire
Softwood rod
It is convenient to make this tool yourself.

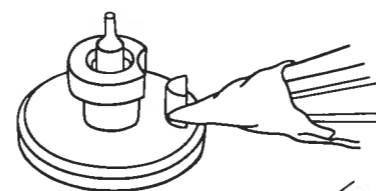
Note: Since the oil quantity cannot be controlled never lubricate the escape wheel directly. (due to special treatment of surface)

(3) Washing the balance

1. Rough washing

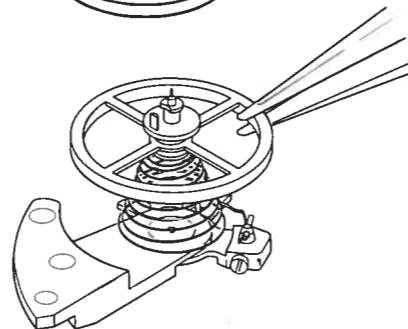
(The balance can be washed with the balance cock attached; however, remove the shock resistant hole jewel with frame.)

Perform ultrasonic washing for one minute. When wiping the balance, wipe and wash the roller jewel thoroughly.



2. Rinsing and drying

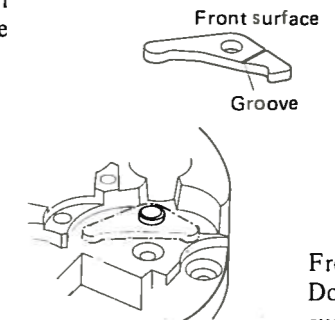
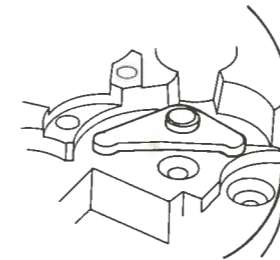
Rinse the balance in fresh benzene and slightly raise the balance with a pair of tweezers to prevent contact with the hairspring; then dry well, using a dryer or other means.



2. Regarding Modification of Parts

(1) Intermediate setting lever

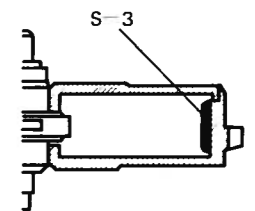
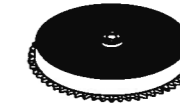
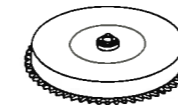
The Intermediate setting lever, conventionally driven in the plate informer models, has been changed to the assembling type.



Front surface is grooved.
Do not mistake the front surface when assembling.

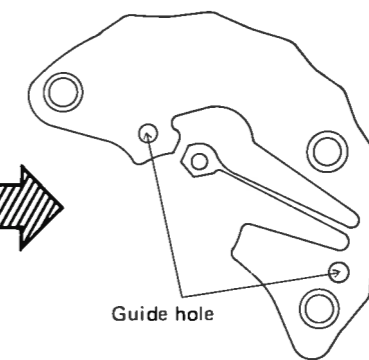
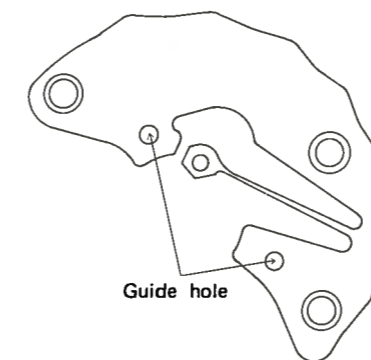
(2) Color of barrel cover

To clearly indicate use of SEIKO Watch Oil S-3, the barrel cover has been colored black.



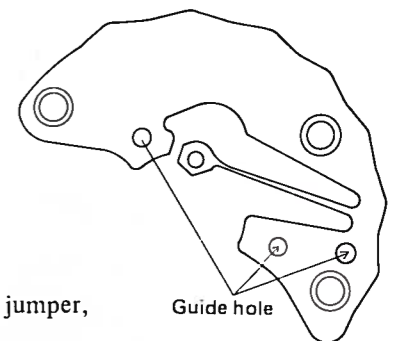
This implies the same meaning as the black ring mark on other watch types.

(3) Day jumper



Shape and position of the guide hole have been changed.

Spare parts



The spare parts can be used for either main plate. When replacing the day jumper, use the spare parts.

SEIKO

ELECTRONIC WATCH

EL-370

1. PRINCIPLE OF OPERATION

1-1 Specification and Features.....	1-3703B-1
1-2 Principle of Operation	1-3703B-2
1-3 Characteristic of Power Cell	1-3703B-4

3703B

1) Specifications

Casing diameter:	29.0mm
Height:	6.6mm
Vibrations per hour:	21,600
Driving mechanism:	Balance driven system
Attached mechanisms:	Power supply switch

Second-setting device
Calendar (push-type Date Corrector
and reciprocating Day Corrector)

Applicable power cell (EVEREADY EPX-77):

Capacity:	165m AH
Voltage:	1.5V
Size:	11.6 φmm x 5.6mm

2) Features

The non-contact-points type electronic watch EL-370, whose balance complete with stud drives the movement, offers high utility. It withstands changes in outside conditions such as magnetism and temperature, and is designed for easy handling at retail stores. Its features are as follows:

- 1) Power cell durability exceeds one year.
- 2) Anti-magnetism quality is enhanced by an application of nonmagnetic materials for the balance and special metals for the case back.
- 3) The power cell to be readily replaced by opening the power cell lid.
- 4) For easy servicing, unit-servicing-system is employed such as Electronic circuit unit and so on.
- 5) Equipped with a power supply switch (which also functions as the second-setting device), a crown-push type date corrector, and a reciprocating type day corrector.



Movement

3703B Principle of Operation

1) Outline of operation

Construction of the driving mechanism embodying the balance complete with stud is shown in Fig. 1.1. Operation of the balance complete causes current to flow through the primary coil, and the current actively drives – through the induction coil – the balance complete. This sequence keeps driving the balance. The oscillations of the balance drives the Jewelled pallet and power is conveyed from the escape wheel to the train wheel to control the hand-setting mechanism.

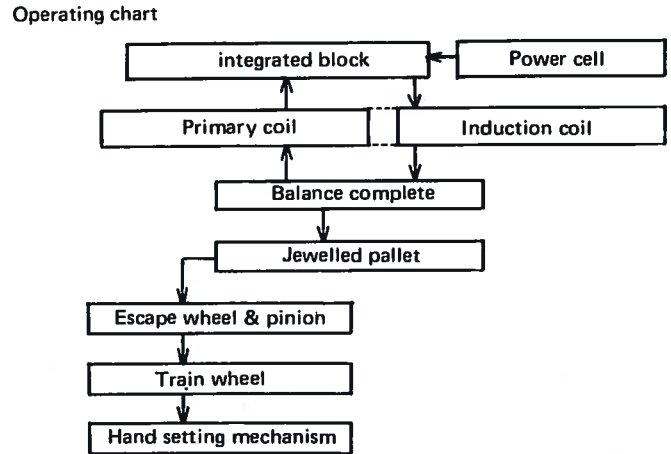


Fig. 1-1

2) Operation of balance and integrated block

- 1) When the crown is depressed from the hand-setting position (the power cell switch is OFF) into the normal position, the second setting is released and the hand-setting lever let the balance start by kicking it off in the arrow direction (see Fig. 12). At the same time, the power cell switch is turned ON and the integrated block is ready to function.
- 2) When the balance is started, the magnetic field of the upper and lower magnets of the balance, passes through the fixed coil and generates a weak current in the primary coil (L₂).
- 3) The weak current generated in the (L₂) flows into the base (B) of the transistor (Tr) and on into the emitter (E) (→ ① in Fig. 1.2). When it flows to (E) from (B), collector (C) and (E) open; as a result, the main current flows through the induction coil (L₁) (→ ② in Fig. 1.2).
- 4) When the main current flows through the(L₁) magnetism is generated in it.
- 5) The balance is rotated due to repelling between the permanent magnet attached to the balance and the magnetism produced in the coil.
- 6) In this way, in accordance with the electricity which is generated in(L₂)at the moment when the magnets attached to the balance pass the coil, main current flows into(L₁)and swings the balance and keep it oscillating.

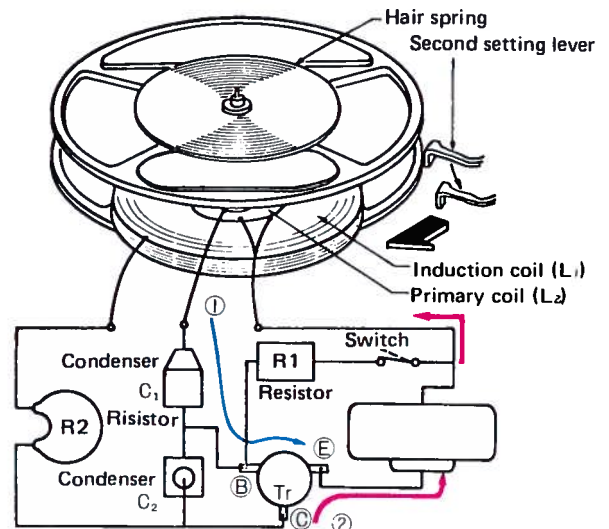


Fig. 1-2

The mechanism of the balance and the integrated block is as shown in Fig. 1.3.

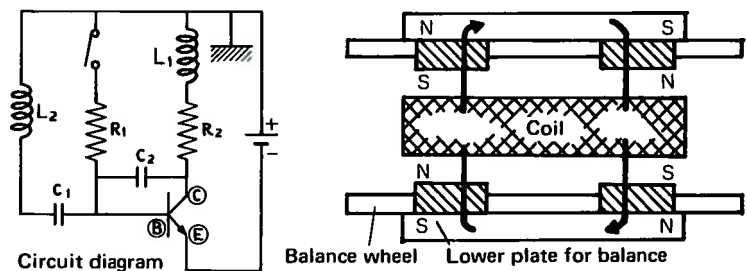


Fig. 1-3

3703B Principle of Operation

3) Escapement

In contrast to the escapement of conventional mechanical watches, the EL-370 employs a reversed type which conveys driving energy from the balance to the jewelled pallet, whose pallet jewels rotate the escape wheel to convey the energy to the train wheel. That is, the direction of transmitting force is reversed. To ensure its drawing force at a stop, the jewelled pallet is equipped with a permanent magnet.

- 1) This permanent magnet and the banking pin magnetically draw each other so that the jewelled pallet is drawn to the side of the pallet cock. The roller jewel enters the fork slot to operate the jewelled pallet.

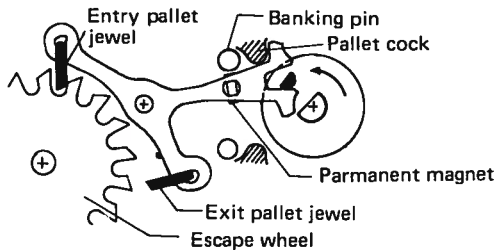


Fig. 1-4

- 3) The jeweled pallet is kept in a halted condition by the drawing force of the permanent magnet.

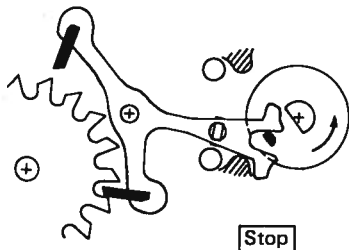


Fig. 1-6

- 2) The impulse surface of the exit pallet jewel pushes that of the escape wheel which is moved in the arrowed direction.

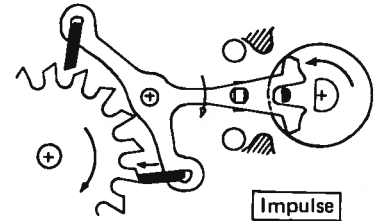


Fig. 1-5

- 4) The roller jewel returns to enter the fork slot and moves the jewelled pallet in → direction. At the same time, the impulse surface of the entry pallet jewel pushes that of the escape wheel and pinion, which is moved forward. The sequence of the above operations is repeated.

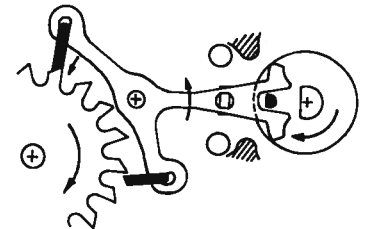


Fig. 1-7

Retaining pawl mechanism

The escape wheel and pinion is equipped with the click wheel. When a reverse torque due to operation of the date driving wheel, hands setting, and so on, is applied to the train wheel, reversal of the escape wheel is prevented by the engagement of the click wheel and the retaining pawl.

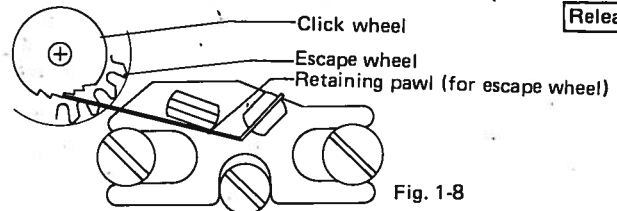


Fig. 1-8

4) Train wheel

Arrangement of the train wheels is shown in Fig. 1-9. Driving torque is transmitted in the direction opposite to that of a mechanical watch.

The torque of the escape wheel and pinion is conveyed as follows: from the sweep second wheel and pinion to the second hand, through the sweep second wheel and pinion and the third wheel and pinion to the minute hand of the cannon pinion, from the cannon pinion, through the minute wheel to the hour hand of the hour wheel.

The sweep second wheel is equipped with a friction spring for sweep second pinion, which brakes the sweep second wheel and prevents the second hand from fluctuating.

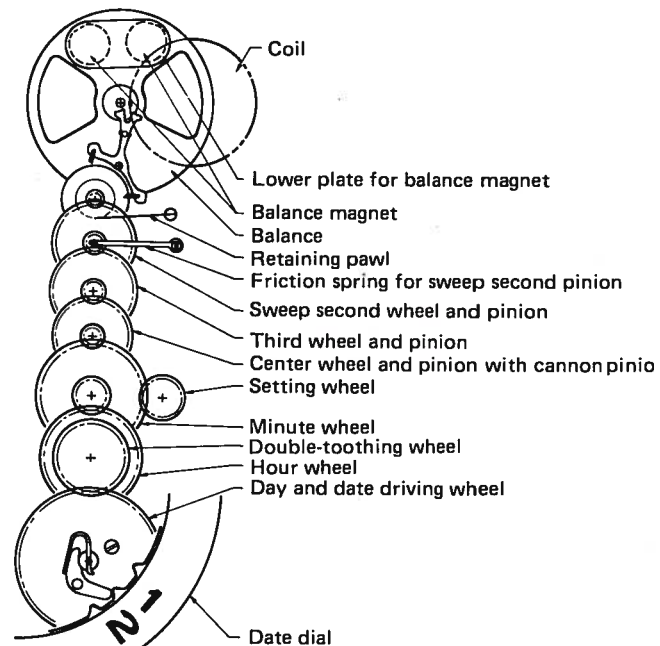
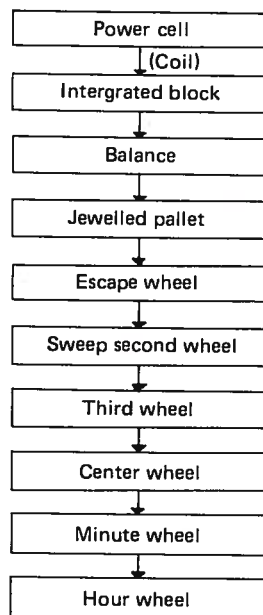


Fig. 1-9

3703B Principle of Operation

5) Power supply switch and second setting device

When the crown is pulled out, the clutch lever moves in the arrow direction shown in Fig. 1.10 and go away from the contactor pin, disconnecting the current flow through the integrated block.

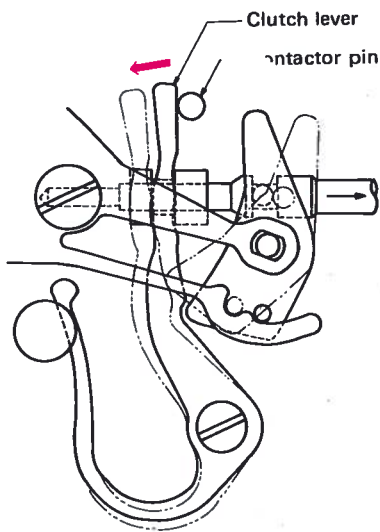


Fig. 1-10

- The second setting lever, fitted in the slot of the clutch wheel, stops the balance complete when the crown is pulled out. It also functions as the starter by kicking off the balance wheel when it is released.

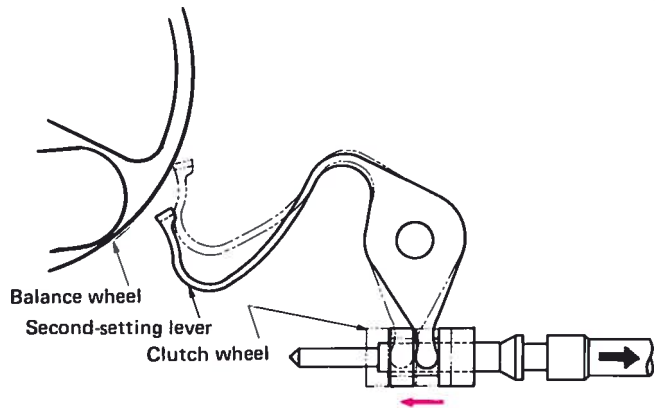


Fig. 1-11

6) Calendar correcting mechanism

When the crown is depressed, the hand-setting stem, setting lever with axle, date corrector, and date corrector finger are brought into interlocking to correct the date.

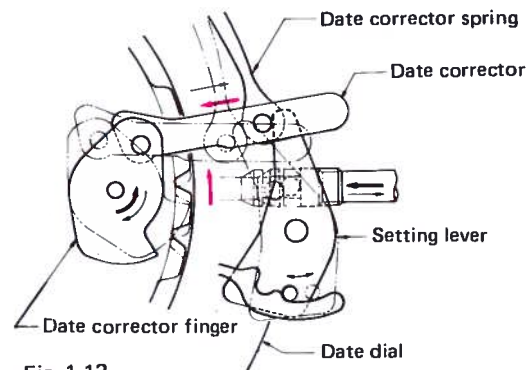


Fig. 1-12

Characteristics of Power Cell

The power source of the EL-370 is a silver-oxide mini-battery (its positive electrode of silver oxide, its negative electrode of zinc, and its electrolyte a concentrated alkaline solution.) Its features are as follows:

1. A constant operating voltage, whose deterioration during discharge is quite limited.
2. A large electric capacity.
3. It hardly deteriorate against changes in the outside temperature, always a reliable operating condition.
4. The power cell is suitable for discharging a micro current for long periods, and there is no possibility of electrolyte leakage.

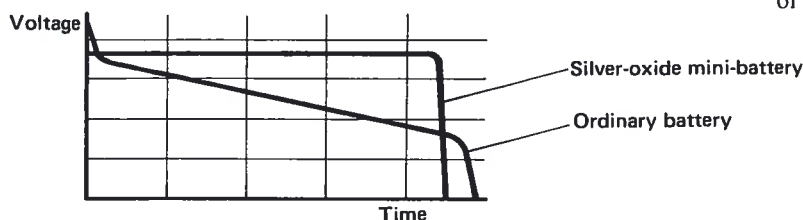


Fig. 1-13

SEIKO

ELECTRONIC WATCH

EL-370

2. REPAIR JIGS AND TOOLS

2-1 Repair jigs and Tools for EL-370.....2-3703B-1

3703B Repair Jigs and Tools

1) Tester

The tester is used for measuring current, power cell voltage, and circuit resistance; it must meet the following requirements:

- ① It must be applicable to the following measuring ranges:

Current:	5 to 15 μ A
Voltage:	1.4 to 1.6V
Resistance:	0.5 to 15 K Ω
- ② Internal resistance

For measuring voltage:	over 20 K Ω
For measuring current:	over 2 K Ω



2) Condenser kit

For measuring current consumption, be sure to use a condenser.

Connect lead wire and clips as shown in the figure below to a condenser of 200 to 500 μ F (withstandability is over 3V).



3) Movement holder

Use a special movement holder for EL-370.



4) Power cell holding spring and set screw

When putting the watch in motion with the case back open, use the holding spring for the power cell to pass current and to hold the power cell in position.



Suggestion:

When making the holding spring, use a metal plate of good conductivity referring to the procedure as shown in Fig. 2.1.

Cut the metal plate to suitable size.

Bend the plate and drill a hole in it.

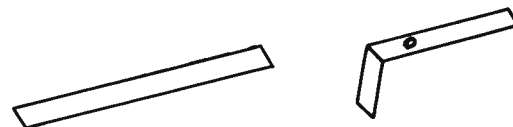


Fig. 2-1

5) Others

- 1) Nonmagnetic tweezers: Used to handle the parts with magnets such as the jewelled pallet fork and staff, balance complete with stud.
- 2) Nonmetallic tweezers: Used to handle the power cell. (The wear finger coat when handling the power cell or tweezers of bamboo or plastic can be used.)

SEIKO

ELECTRONIC WATCH

EL-370

3. DISASSEMBLING AND REASSEMBLING THE WATCH AND REPLACING THE POWER CELL

3-1 Replacing the Power Cell	3-3703B-1
3-2 Calendar Mechanism	3-3703B-2
3-3 Integrated Block	3-3703B-3
3-4 Controlling Mechanism and Escapement	3-3703B-4
3-5 Train Wheel	3-3703B-5
3-6 Setting Mechanism	3-3703B-6

Disassembling and Reassembling

- 1) Disassemble the watch according to the procedures shown in figures ① to ⑤③
- 2) Reassemble the watch according to the procedures ⑤③ to ①
- 3) For disassembling and reassembling procedures marked ▶ refer to the manual of inspecting procedures and repairs.

Lubricating the Watch

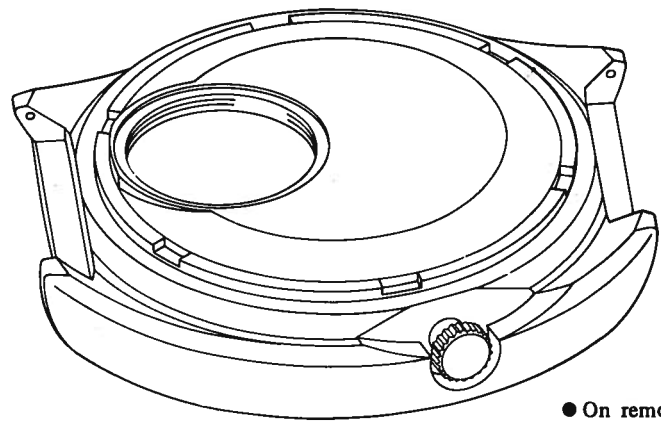
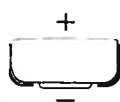
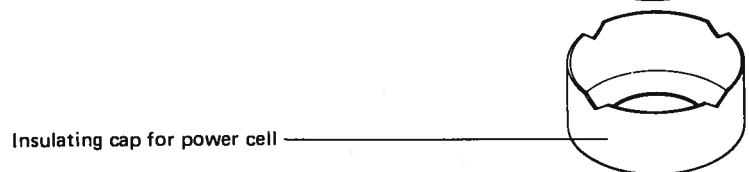
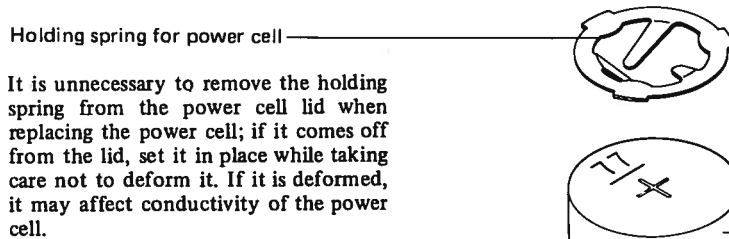
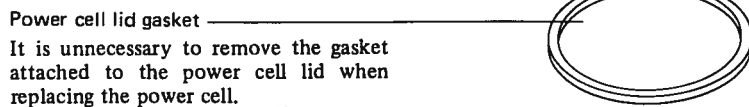
The following symbols appearing in the disassembling and reassembling diagrams indicate the types of oil, its quantities to be applied, and lubricating points:

Types of oil	Oil quantity
▶ Moebius Synt-A-Lube	●●● Sufficient quantity
▶ SEIKO Watch Oil S-4	●● Normal quantity
	● Extremely small quantity

3703B Replacing the Power Cell

3-1 Replacing the Power Cell

The power cell can be readily replaced simply by removing the power cell lid.

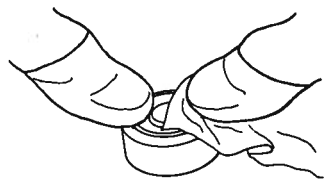


2 Power cell

Remove the power cell by turning the watch over.

- Note:**
- 1) Handle the power cell with wearing finger coat or by using nonmetallic tweezers (metallic tweezers will short-circuit the power cell).
 - 2) Inspect the power cell for voltage.
 - ▶ For inspecting procedures, refer to 4.3703B-2.
 - 3) Set the power cell in place with its plus (+) pole up (facing the lid) and with its minus (-) pole down.
 - 4) Inspect the current consumption.
 - ▶ For inspecting procedures, refer to 4.3703B-2

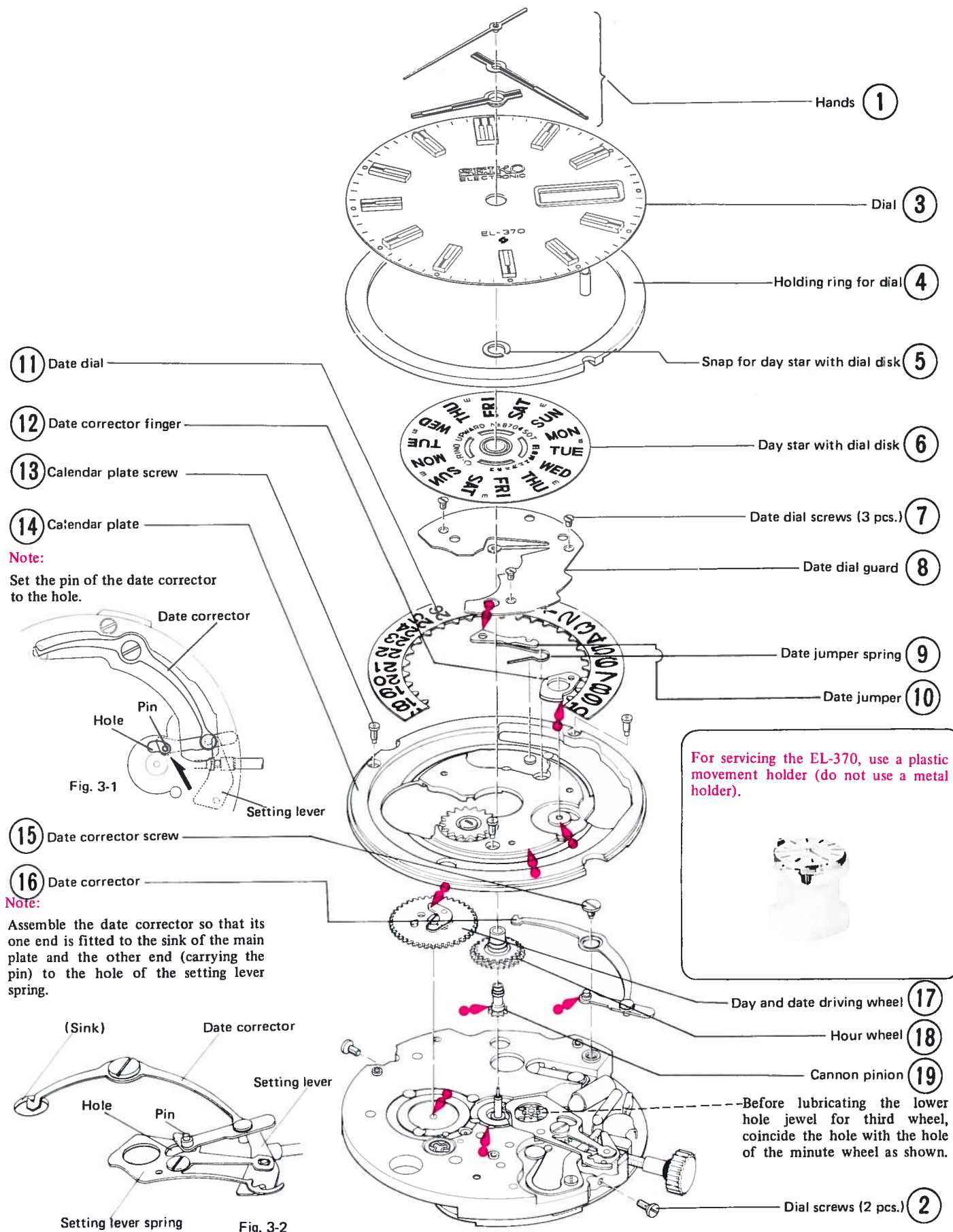
● On removing the power cell lid, the watch ceases to run.



- Note:**
1. Store packed power cells in a storage area where the temperature is comparatively low and humidity is relatively low.
 2. Be sure to discard used power cells (if they are left intact, they may not be distinguishable from brand-new ones).
 3. Wipe it thoroughly with a dry cloth before putting it to use. If an (+) pole surface has something printed, wipe off the print with thinner or benzene.

If the power cell is overheated by direct fire or direct soldering, it may explode. Be sure to avoid overheating it.

3703B Calendar Mechanism



3703B Integrated Block

20

Power cell

- Handle the power cell carefully to avoid short-circuiting.
- Use a EPX-77 power cell.
- Before setting a power cell, check it for voltage.
- ▶ For the checking of the voltage, refer to 4.3703B-2.

Note:

- 1) After setting the power cell, hold it with a temporary power cell holding spring (necessary for ascertaining if the watch works) as shown in Fig. 3.3.

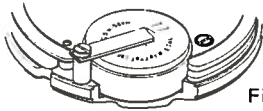


Fig. 3-3

- 2) On adjusting the hand-setting stem to its normal position, the watch will begin to run. By so doing, the following checks are required.
 - ▶ Check on current consumption according to 4.3703B-2 and check on the amplitude. If it refuses to function, repair it according to the Guide to Inspection and Repair.
- 3) If the stroke of the timegrapher is weak, adjust its volume.

22

Coil block screws (2 pcs)

When tightening or loosening the coil block screws, be careful not to break the coil.

[Coil block]

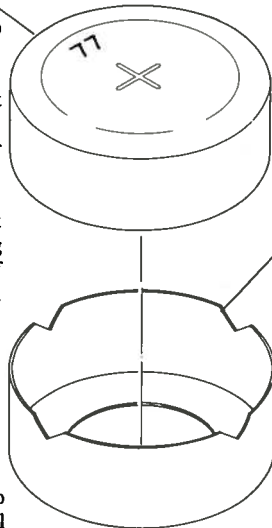
[Circuit block]

Do not disassemble the coil block and circuit block except when inspecting and repairing them,

23

Circuit block screws (2 pcs)

(The circuit block screw in the diagram on the right is for grounding the terminal.)



Insulating cap for power cell 21

Since the insulating cap for power cell is used to prevent a short circuit, be sure to mount it on the assembly.

24

Integrated block

The coil block combined with circuit block is referred to as an "Integrated block."

- 1) Assemble the integrated block by turning the balance wheel through an angle of about 90 degrees from its rest position (Fig. 3.4).

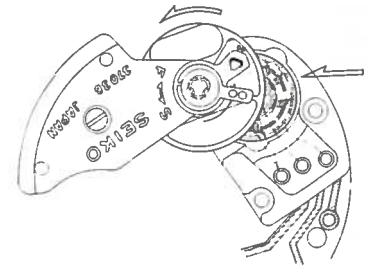
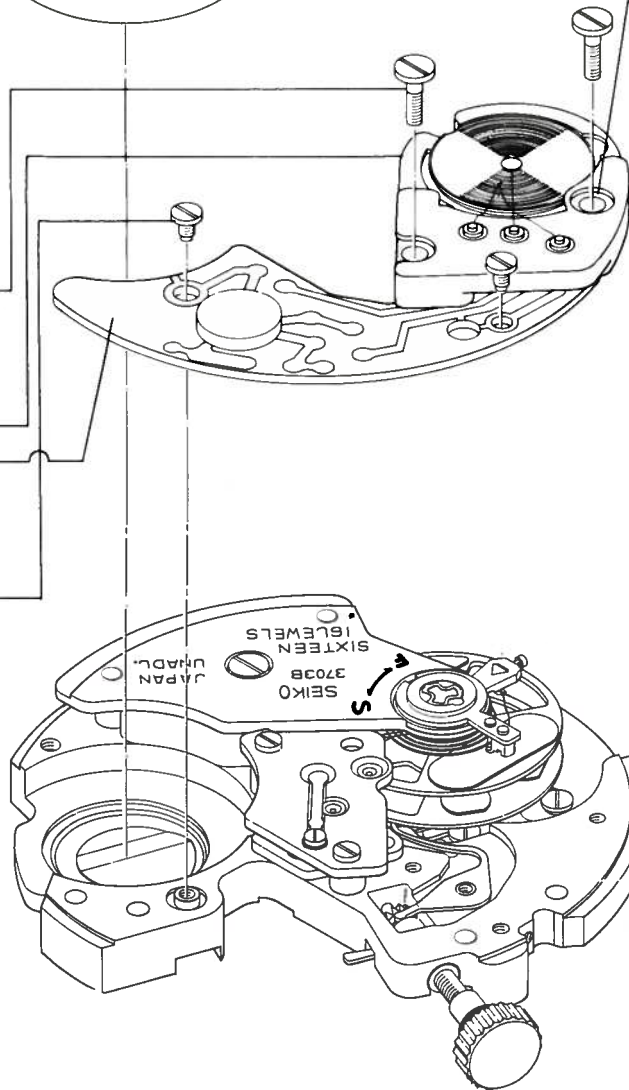


Fig. 3-4

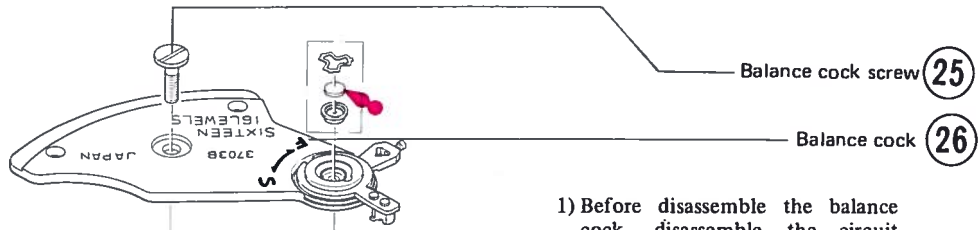


- 2) When replacing the circuit and coil blocks, inspect and replace each block and tighten the terminal screw of integrated block.
 - ▶ For replacing the circuit and coil blocks, refer to 4.3703B-4.
- 3) After assembling the integrated block, check the following:
 - ▶ For checking of clearance between the coil and the balance complete with stud, refer to 4.3703B-5.
 - ▶ For checking and adjusting the power supply switch, refer to 4.3703B-3.

3703B Escapement and Governor Mechanism

Warning

Since the EL-370 employs magnets for its balance complete with stud and the jewelled pallet fork and staff, never demagnetize its complete movement or any part of it.



28 Balance cock washer

29 Second-setting lever

Note:
 1) If the spring portion is deformed, the lever's second setting performance will be affected.
 2) When assembling the integrated block, confirm that the second-setting lever is in correct position.

30 Retaining pawl screws (2 pcs)

Note:
 Tighten the retaining pawl screws so that they are located in the center of the retaining pawl (for escape wheel) as shown.

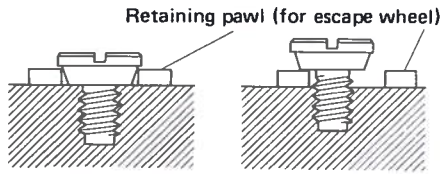


Fig. 3-5

32 Pallet cock screws (2 pcs)

33 Pallet cock

After assembling the pallet cock, be certain to check on the drawing force of the permanent magnet.
 ▶ For this checking procedure, refer to 4.3703B-5.

34 jewelled pallet fork & staff

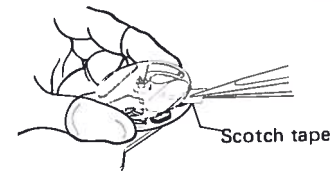
1) Since the jewelled pallet is equipped with magnets, be sure to handle it with non-magnetic tweezers.
 2) Remove the chips and dust from permanent magnet.

- 1) Before disassemble the balance cock, disassemble the circuit block.
- 2) Handle the balance complete with stud very carefully.

Balance complete with stud 27

Note:
 Since the balance complete with stud has two wheels (the upper wheel and the lower wheel both having two magnets each), be careful of the follows:

- 1) Handle it with non-magnetic tweezers.
- 2) Handle only one of the upper or lower balance wheels with tweezers. If the both wheels are held together, the clearance between them will be changed and they may sometimes scrape against the coil.
- 3) Remove chips and dust from the magnets. It is convenient to use the "Scotch tape."



- 4) To prevent the balance wheels from rubbing against the coil, check it for shakes.

▶ For adjusting the clearance, refer to 4.3703B-5.

Retaining pawl 31

Note:

- 1) Do not turn the spring pin driven into the retaining pawl except when adjusting it.
- 2) By operating the jewelled pallet, confirm if the retaining pawl properly engages with the click wheel of the escape wheel (if this engagement is improper, it will cause the watch stopping).
 ▶ For inspecting the retaining pawl, refer to 4.3703B-6.
- 3) After inspection of (2), above, check the contacting condition of the jewelled pallet fork and staff with the escape wheel by referring to Fig. 3.6, below.

Amount of contact at initial stage of impulse

Amount of contact at the stopping condition

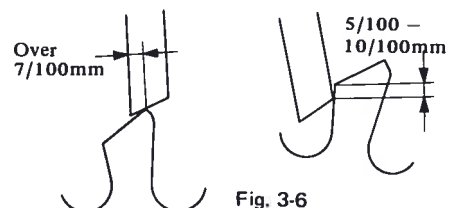
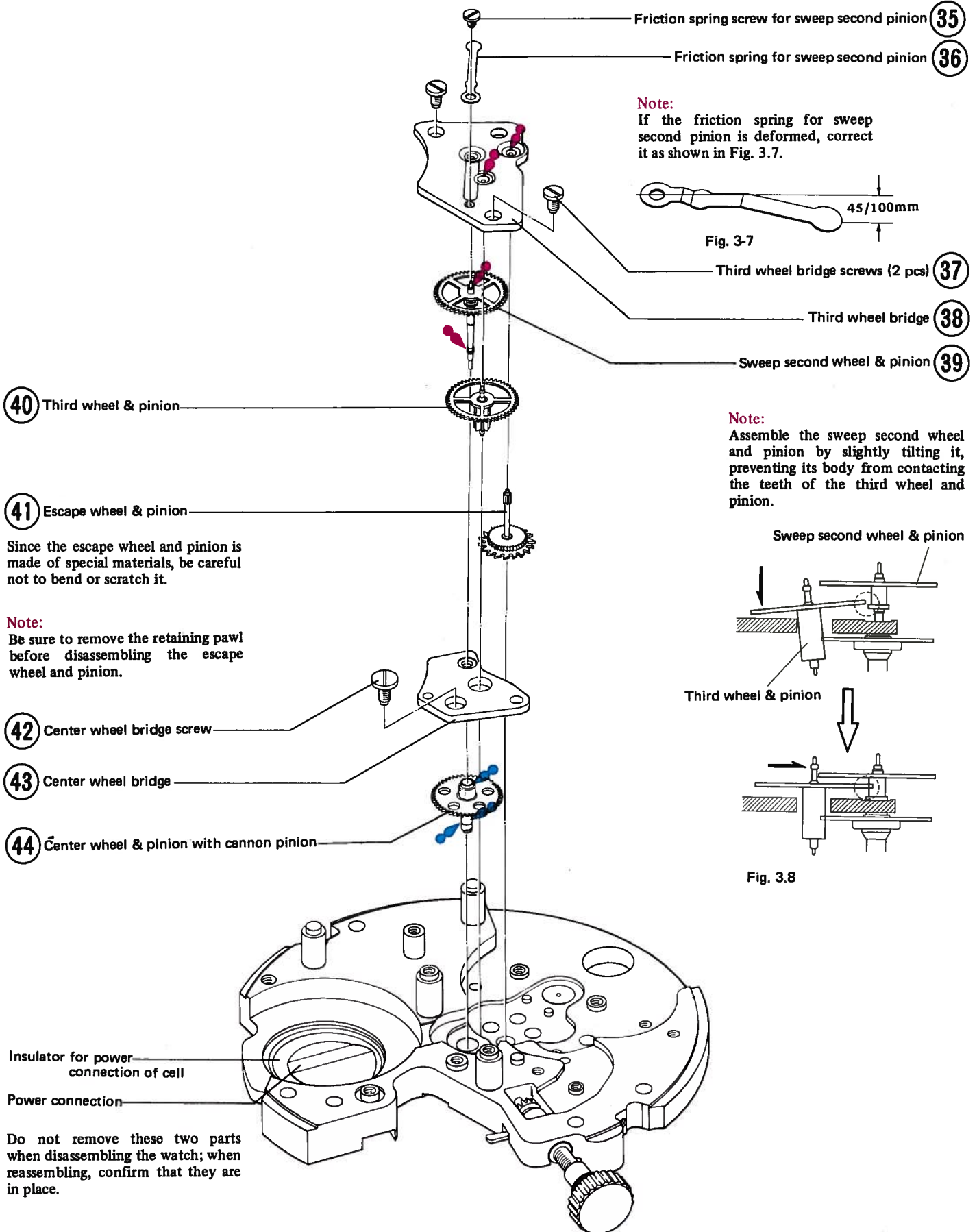


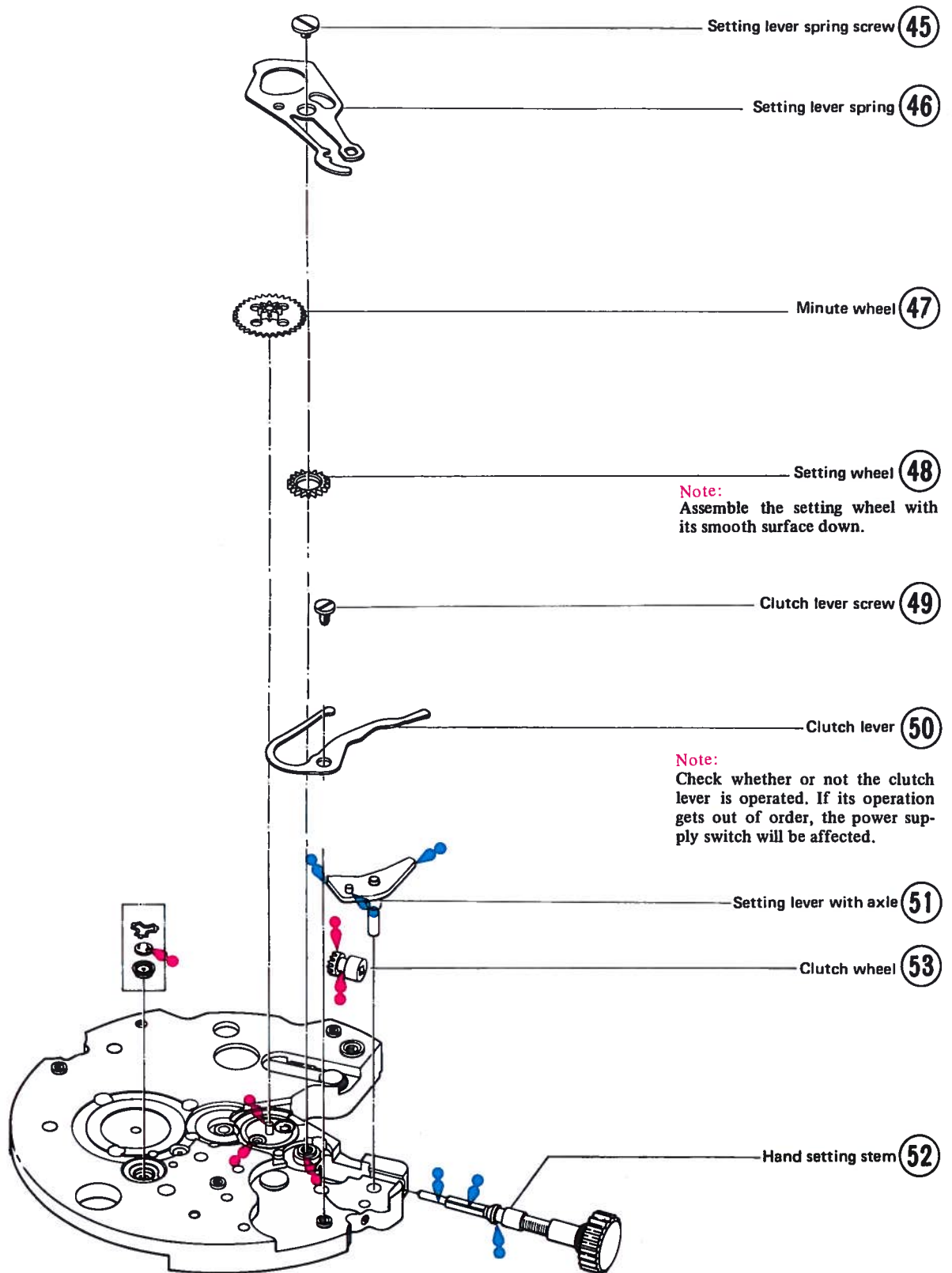
Fig. 3-6

When checking the amount of contact at the initial stage of impulse, turn the escape wheel in reverse direction by the amount of play between the retaining pawl and click wheel.

3703B Train Wheel



3703B Setting Mechanism



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ELECTRONIC WATCH

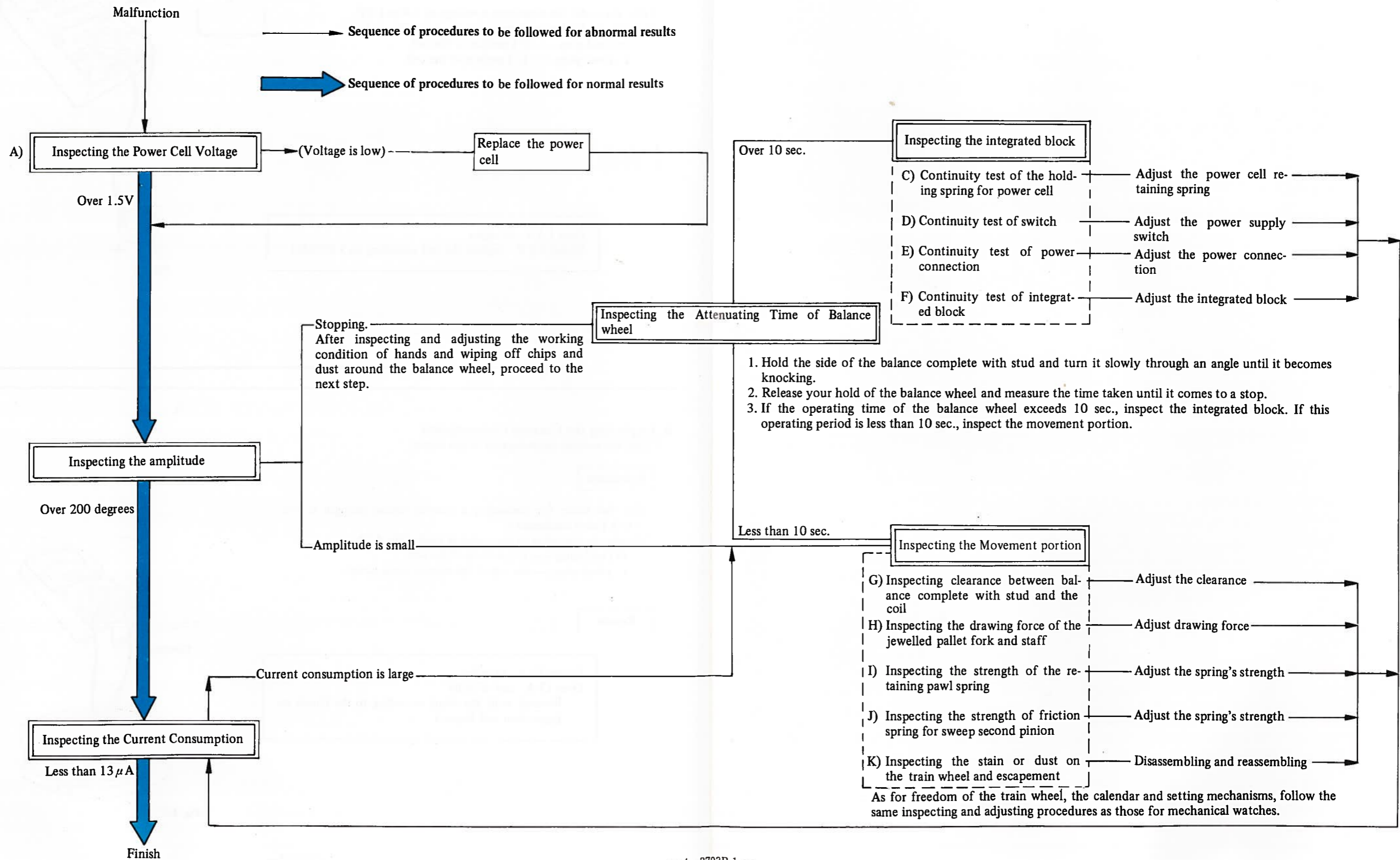
EL-370

4. INSPECTION AND REPAIR METHODS

- 4-1 Guide to Repairs.....4-3703B-1**
- A. Inspecting the Power Cell Voltage4-3703B-2**
- B. Inspecting the Current Consumption.....4-3703B-2**
- C. Inspecting and Repairing Continuity of
the Holding Spring for Power Cell.....4-3703B-3**
- D. Inspecting and Repairing Continuity of
the Switch4-3703B-3**
- E. Inspecting and Repairing Continuity of
the Power Connection for Cell.....4-3703B-3**
- F. Inspecting and Repairing Continuity of
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- G. Inspecting and Adjusting Clearance
Between the Balance Complete with
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- H. Inspecting and Adjusting the Drawing
Force of Jewelled Pallet Fork and Staff 4-3703B-5**
- I. Inspecting and Adjusting the Retaining
Pawl4-3703B-6**

3703B Guide to Repairs

The EL-370 depends on a silver-oxide mini-battery for its power source. Many of the repairs required for battery watches originate from the life of this power cell; when repair work is necessary, initially check on the power cell and then follow the inspecting and repairing procedures given below.



3703B Inspecting the Power Cell Voltage Inspecting the Current Consumption

A. Inspecting the Power Cell Voltage

Confirm if the power cell voltage is normal.

Procedures

- 1) Set the tester for measuring a voltage of 1.4 to 1.6V.
- 2) Apply the lead-plug of the tester as under (Fig. 4.1);
(+) lead-plug — (+) surface of the cell.
(-) lead-plug — (-) surface of the cell.

Results

Over 1.5 V : in order
Under 1.5 V : replace the cell according to 3.3703B-1

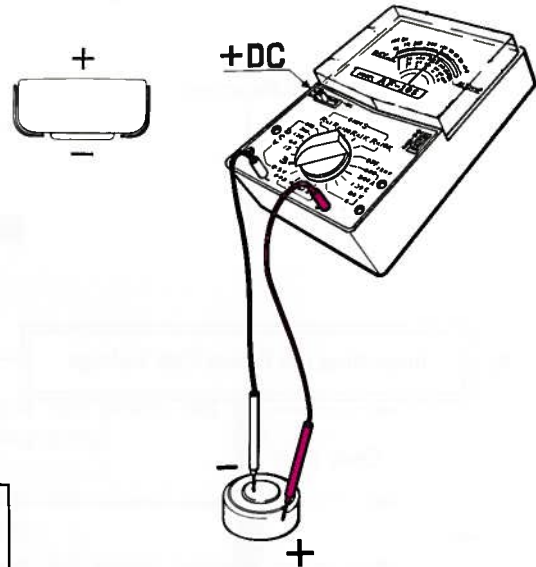


Fig. 4-1

B. Inspecting the Current Consumption

Check the current consumption of the watch.

Procedures

- 1) Set the tester for measuring a current whose strength is 5 to 15 μ A (use a condenser).
- 2) Apply the lead-plug of the tester as under (fig. 4.2);
(+) lead-plug — (+) surface of the cell.
(-) lead-plug — the top of the balance cock screw.

Results

Under 13 A : in order
Over 13 A : out of order
Proceed with the steps according to the Guide to
Inspection and Repairs.

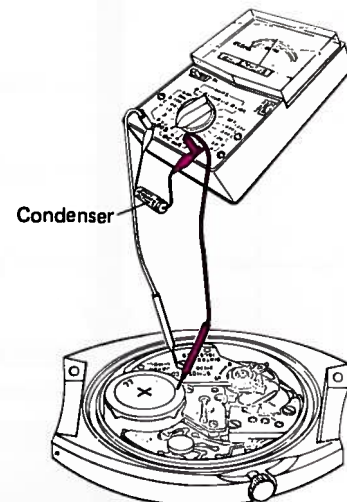
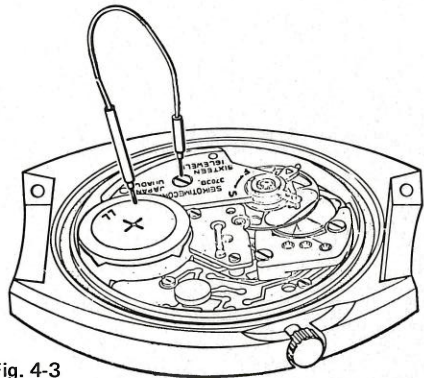
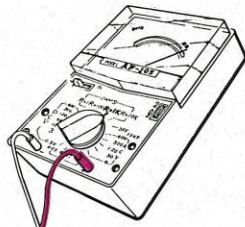
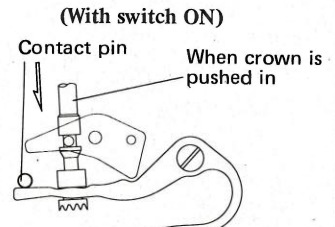
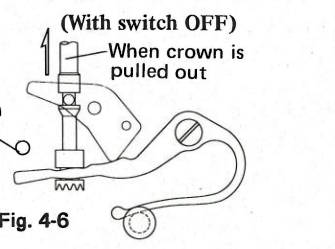
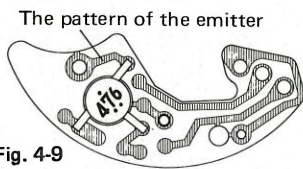
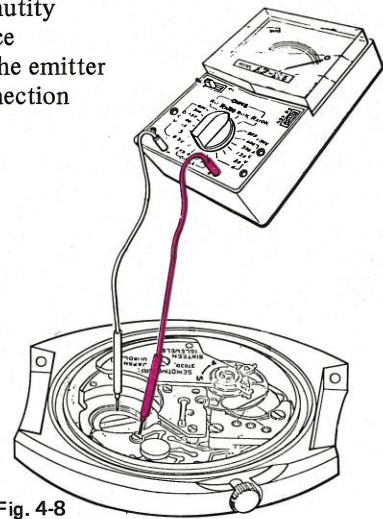
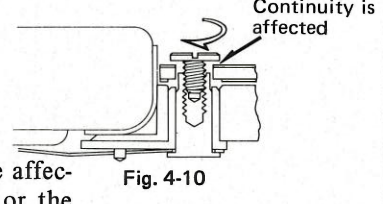
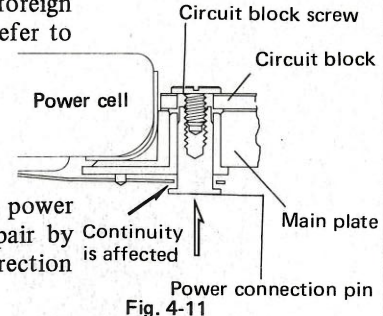


Fig. 4-2

3703B Inspecting continuity of the contact point and electronic circuit and their repair procedures

	Procedures	Results	Adjustment and repairs
<p>C. Inspecting and Repairing Continuity of the Holding Spring for Power Cell</p>	<p>Check of continuity between the power cell and the holding spring for the power cell.</p> <p>1) Push the crown (switch ON)</p> <p>2) Using one piece of a lead plug</p> <p style="padding-left: 20px;">One end—the (+) surface of the power cell</p> <p style="padding-left: 20px;">The other end—the top of the balance cock.</p> <div style="text-align: center;">  <p>Fig. 4-3</p> </div>	<ul style="list-style-type: none"> ● The balance complete with stud begins to work. (Continuity of holding spring for power cell is affected.) ● The balance complete with stud will not work. (Parts other than the holding spring for power cell are out of order.) 	<ul style="list-style-type: none"> ● Adjust the holding spring for power cell so that it contacts with the power cell. ● To improve continuity, wipe the power cell and the holding spring for power cell with a cloth moistened in benzene or thinner. ● Proceed to inspection D
<p>D. Inspecting and Repairing Continuity of the Switch</p>	<p>Check the switch for continuity</p> <p>1) Set the tester for measuring resistance</p> <p style="padding-left: 20px;">(+) lead plug—the top of the balance cock</p> <p style="padding-left: 20px;">(-) lead plug—the contact pin.</p> <div style="text-align: center;">  <p>Fig. 4-4</p> </div>	<ul style="list-style-type: none"> ● When the crown is pushed in (switch ON) <ul style="list-style-type: none"> 0 Ω — Normal Over 0 Ω — The contact of switch is affected ● When the crown is pulled out (switch OFF) <ul style="list-style-type: none"> Over 2M Ω — Normal Under 2M Ω — Integrated block is out of order 	<ul style="list-style-type: none"> ● Proceed to inspection E ● Remove foreign objects, oil, and so on adhering to the contact pin and the top of the clutch lever. If the contact is still affected, the operation of the clutch lever is considered to be out of order. Check the play of clutch lever. Do not bend the contact pin; a bending contact pin will cause the malfunction of the circuit. ● If the switch is not completely OFF despite the fact that the contact pin is detached from the clutch lever (under 2M Ω), consider the circuit block is as affected. Replace the circuit block. <div style="text-align: right;">  <p>Fig. 4-5</p>  <p>Fig. 4-6</p> </div>
<p>E. Inspecting and Repairing Continuity of the Power Connection</p>	<p>Check the power connection for continuity</p> <p>Set the tester for measuring resistance</p> <p style="padding-left: 20px;">(+) lead-plug—the pattern of the emitter</p> <p style="padding-left: 20px;">(-) lead-plug—the power connection</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Fig. 4-9</p> </div> <div style="text-align: center;">  <p>Fig. 4-8</p> </div> </div>	<ul style="list-style-type: none"> ● Meter indicates 0 — Normal ● Meter reads other than 0 — Out of order <p style="padding-left: 40px;">Apply the lead plugs as under (Fig. 4.8)</p> <p style="padding-left: 60px;">(+) lead plug — circuit block screw</p> <p style="padding-left: 60px;">(-) lead plug — power connection</p> <ul style="list-style-type: none"> ● Meter reads 0 Ω ● When meter reading is other than 0 Ω 	<ul style="list-style-type: none"> ● Proceed to inspection F ● The power connection is considered to be affected by an insufficiently tightened screw or the adhesion of foreign matter; remove the foreign matter and tighten the screw securely. (Refer to Fig. 4-10) ● Contact of the power connection and the power connection setting-screw is affected. Repair by tapping the power connection pin in direction shown in Fig. 4.11. <div style="text-align: right;">  <p>Fig. 4-10</p>  <p>Fig. 4-11</p> </div>

3703B Inspecting continuity of the contact point and electronic circuit and their repair procedures

F. Inspecting and Repairing the Integrated Block

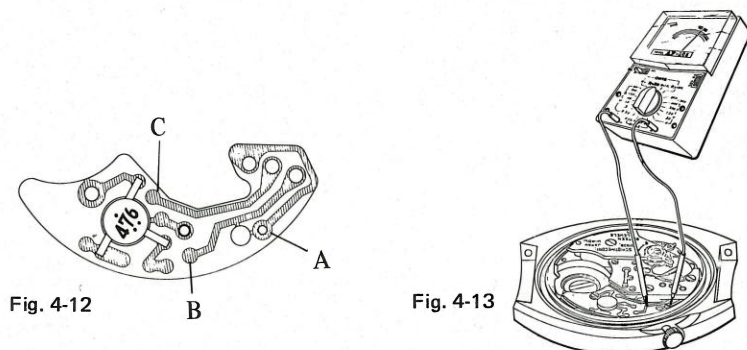
When inspecting the integrated block, initially conduct the inspection mentioned in F-1. If the result of measurements according to F-1 reveals larger or smaller resistance values, inspect only the coil block mentioned in F-2 to make adjustments.

F-1. Inspecting the integrated block

This inspection is to check the integrated block (combination of circuit block and coil block) for continuity.

Procedures

1. Set the tester for measuring resistance from 0 to 10k Ω
2. Measurement:
 - Measure the resistance between A-B and A-C of the circuit block pattern.
 - a) Resistance between A-B
 - (+) lead plug — pattern A of the circuit block
 - (-) lead plug — pattern B
 - b) Resistance between A-C
 - (+) lead plug — pattern A of the circuit block
 - (-) lead plug — pattern C



Results	Action
Large resistance value— A-B: over 7k Ω A-C: over 2.0k Ω	Proceed to F-2 (Inspecting the coil block)
Small resistance value— A-B: under 4k Ω A-C: under 0.5k Ω	Proceed to F-2 (Inspecting the coil block)
A-B: 4 to 7k Ω A-C: 0.5 to 2.0k Ω	

F-2. Inspecting the coil block

(when the result of F-1 shows larger or smaller resistance values)

Procedure

1. Remove three terminal screw of integrated block to separate the coil block.
2. Set the tester for measuring resistance from 2 to 15k Ω
3. Measurement
 - Measure resistance between the terminal screw pins B-C.
 - (+) lead plug — the tube for terminal screw B
 - (-) lead plug — the tube for terminal screw C

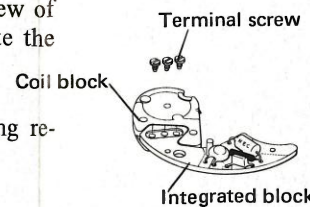


Fig. 4-14

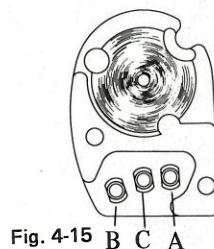


Fig. 4-15

Results

- (1) 4.5 to 9.0 k Ω
- (2) over 9.0 k Ω
- (3) under 4.5k Ω
- (4) 4.5 to 9.0k Ω

Adjustments

Connection between the coil block and the circuit block is defective. Adjust it as follows:

- 1) Securely tighten the terminal screw of integrated block.
- 2) Clean the pattern of the circuit block (arrow position in Fig. 4.17)

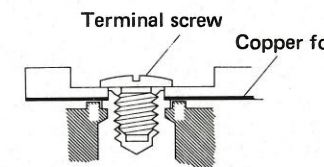


Fig. 4-16

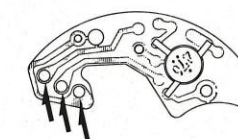


Fig. 4-17

Replace the coil block (the coil is either disconnected or shorted).

Be careful of these points when replacing the coil

- 1) Check the new coil
 - If the top of the tube for terminal screw is located lower than the coil board surface, scrape a little off the oblique lined portion (coil board) as shown in Fig. 4.19 to make it lower than the tube for terminal screw (so that it conforms to the correct position shown in Fig. 4.16).
- 2) Securely tighten the three terminal screws of the integrated block.

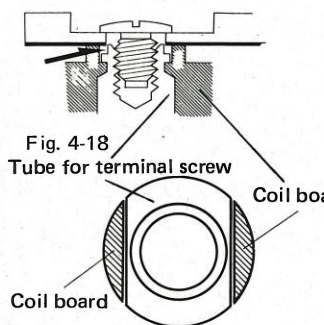
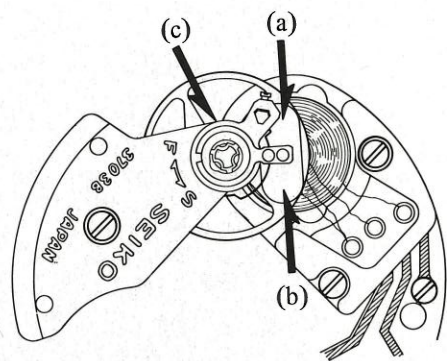
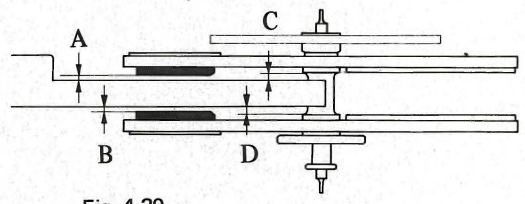
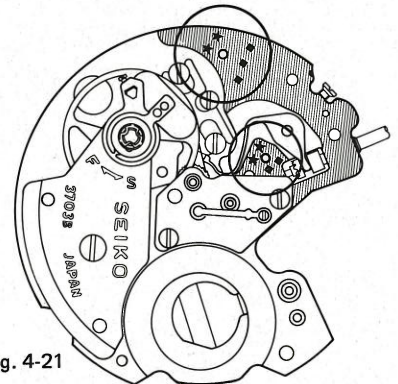
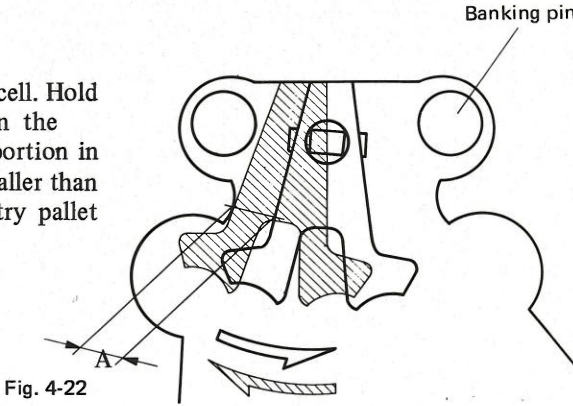
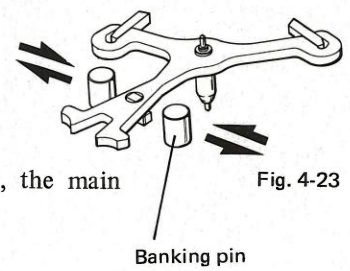


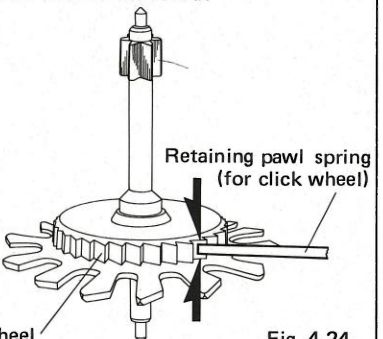
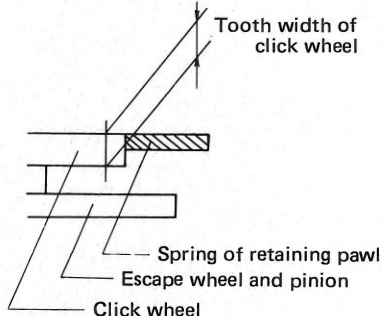
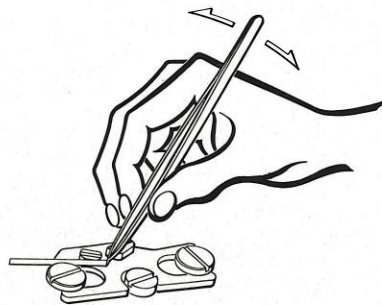
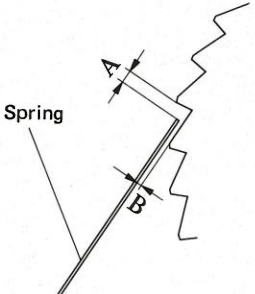
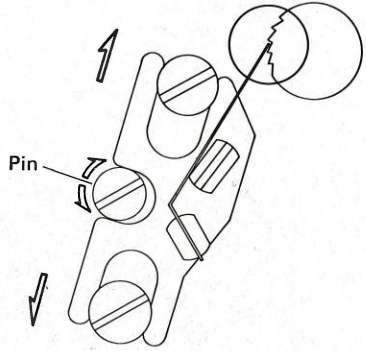
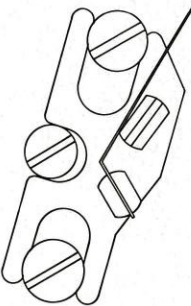
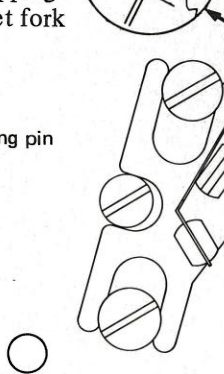
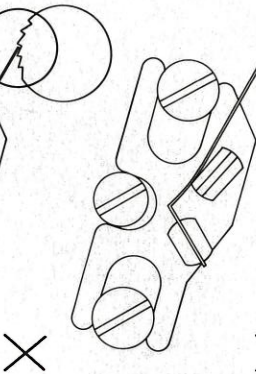
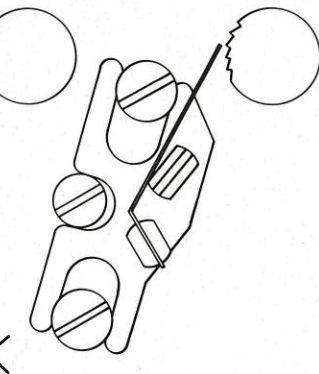
Fig. 4-19

Replace the circuit block (the circuit is out of order).

- 1) Wipe new circuit pattern with a cloth moistened alcohol.
- 2) Securely tighten the terminal screw of the integrated block.

	Procedures	Results	Adjustments
G. Inspecting and Adjusting Clearance Between the Balance Complete with Stud and the Coil	<p>This inspection is to confirm if the clearance between the balance wheel and the coil is normal. If the clearance is too small and they are rubbing together, the watch will not keep accurate time or it will cause stopping.</p> <p>Inspection</p> <p>Inspect the movement which is mounted with the balance wheel and the coil.</p> <p>1) Measure the clearance between the balance wheel and the coil at the two points (a) and (b), as shown in Fig. 4-19; measure the clearance A (upper) and B (lower) at point (a) and (b) as shown in Fig. 4-20.</p> <p>2) Measure the clearance between the balance staff and the coil at point (c), shown in Fig. 19; measure clearances C (upper) and D (lower), as shown in Fig. 20.</p>  <p>Fig. 4-19</p>  <p>Fig. 4-20</p>	<ul style="list-style-type: none"> Each clearance A, B, C, and D is over 10/100mm: normal Each clearance A, B, C, and D is under 10/100mm: abnormal 	<p>Proceed to step inspection H</p> <p>If the clearance is small, or if the balance wheel and the coil or the balance staff and the coil are rubbing together, repair as follows:</p> <ol style="list-style-type: none"> Adjust the shake of the balance wheel to become a little bit smaller. Adjust the balance wheel so that the shake amount is 2/100 to 4/100mm as shown in Fig. 4.21 Adjust height of the coil. Remove the integrated block from the movement and adjust the lower plate. <ul style="list-style-type: none"> a) When raising the coil, tap the ★ portions of the main plate with a chisel shown in Fig. 4-21. b) When lowering the coil, tap the ■ marked portions of the main plate shown in Fig. 4-21.  <p>Fig. 4-21</p>
H. Inspecting and Adjusting the Drawing Force of Jewelled Pallet Fork and Staff	<p>This inspection is to confirm if the drawing force of the jewelled pallet is normal.</p> <p>If the magnitude and symmetry of the drawing force get out of order, the following abnormalities will result:</p> <ol style="list-style-type: none"> The amplitude will change and give rise to wrong timing. The current consumption will increase so that durability of the power cell is affected. <p>Inspection</p> <p>Assemble the pallet fork and staff and remove the power cell. Hold the lever end with non-magnetic tweezers and move it in the direction (Fig. 4.22) from the rest position (oblique lined portion in Fig. 4.22) by the amount of A (about 30/100mm, a little smaller than the fork slot width). (Follow this procedure as to the entry pallet jewel side and the exit pallet jewel side.)</p>  <p>Fig. 4-22</p>	<ul style="list-style-type: none"> The lever returns to its original position. (Oblique lined portion in Fig. 4.22.) Normal The lever will not return to its original position Abnormal 	<p>Proceed to step inspection I</p> <ol style="list-style-type: none"> Adjust by bending the banking pin driven into the main plate in the direction, shown in Fig. 4.23. If the jewelled pallet fork and staff is asymmetrical, adjust the banking pin only on the asymmetrical side. If the asymmetry cannot be adjusted by bending the banking pin, replace the jewelled pallet fork and staff. When replacing it, check its drawing force.  <p>Fig. 4-23</p> <p>Note: If the banking pin is broken, the main plate will be affected.</p>

3703B Inspecting the retaining pawl

Procedures	Results	Adjustments and repairs
<p>This inspection is to confirm if the spring of the retaining pawl (for click wheel) is normal.</p> <p>If the spring force is excessive, the loss of wheel torque will be increased and escapement efficiency will be affected. If the spring force is too weak, the spring will not function. If the spring is not in position, the operation of the escapement will be affected.</p> <p>Inspection</p> <p>1) Confirm if the tip of the spring for retaining pawl is within the tooth width of the click wheel; arrowed portion shown in Fig. 4.24.</p> <div style="text-align: center;">  <p>Retaining pawl spring (for click wheel)</p> <p>Click wheel</p> <p>Fig. 4-24</p> </div>	<ul style="list-style-type: none"> ● Within the tooth width — Normal ● Out of the tooth width — Abnormal <div style="text-align: center;">  <p>Tooth width of click wheel</p> <p>Spring of retaining pawl</p> <p>Escape wheel and pinion</p> <p>Click wheel</p> </div>	<p>Hold the tip of the spring for retaining pawl with tweezers and adjust the spring by bending it as shown in Fig. 4.25.</p> <div style="text-align: center;">  <p>Fig. 4-25</p> </div>
<p>2) Check the contacting amount A of the retaining pawl with the click wheel.</p> <p>Note: When turning the click wheel by operating the jewelled pallet to the right and left, the tip of the spring must drop from the tooth crest of the click wheel.</p> <p>When measuring dimensions A and B (Fig. 4.26), adjust so that the pallet jewel contacts the tooth face and the flank of the escape wheel and pinion when stopped.</p> <div style="text-align: center;">  <p>Spring</p> <p>Fig. 4-26</p> </div>	<p>Dimension A</p> <ul style="list-style-type: none"> ● Approx. thickness of spring — Normal ● Other than thickness of spring — Abnormal 	<p>Adjust by turning the pin (Fig. 4.27) driven into the main plate, in the stopping condition of the jewelled pallet fork and staff.</p> <div style="text-align: center;">  <p>Pin</p> <p>Fig. 4-27</p> </div> <p style="text-align: right;">Note: (1) When the spring of the retaining pawl has been adjusted, check it for its relation with the jewelled pallet fork and staff in accordance with the disassembling and reassembling procedures given in 3.3703B-4.</p> <p style="text-align: right;">(2) When each item of adjustment has been completed, check the jewelled pallet for overall balance.</p>
<p>3) Check clearance B between the retaining pawl and the click wheel (inspection of spring force) shown in Fig. 4.26.</p>	<p>Dimension B</p> <ul style="list-style-type: none"> ● Approx. thickness of spring — Normal ● Other than thickness of spring — Abnormal 	<p>Adjust by turning the adjusting pin for the retaining pawl in stopping condition of the jewelled pallet fork and staff.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Adjusting pin</p> <p>Fig. 4-28</p> </div> <div style="text-align: center;">  <p>Fig. 4-29 (Normal)</p> </div> <div style="text-align: center;">  <p>Fig. 2-30 (Too strong)</p> </div> <div style="text-align: center;">  <p>Fig. 2-31 (Too weak)</p> </div> </div>

4006A (Seiko BELL-MATIC)

1. Specifications

Casing diameter	31.20 mm
Height	7.15 mm
Vibrations per hour	19,800
Automatic winding with sweep second	
Calendar (day and date)	
Instant date setting device	
Bell alarm device	

2. Structure of casing part

2-1. Glass

Glass with tension ring (Fig. 1 & 2)

2-2. Case back (Screw type)

A gasket mounted on the outside of the screwed part maintains a waterproof condition. (Fig. 1 & 2)

2-3. Securing the movement

The movement is secured by the casing spring which is located between the case back and the movement. (Fig. 2)

2-4. Crown

Ordinary waterproof type

2-5. Bell button

A bell button for setting the bell and date is attached at the 2 o'clock position.

This bell button is of the same waterproof construction as the crown of the recessed crown type. (Fig. 3)

2-6. Dial

Dial is especially shaped, provided with an edge to determine the positions of the dial and the alarm setting wheel. (Fig. 1)

2-7. Alarm setting wheel

An alarm setting wheel is provided on the dial periphery. This feature is found only in the 4006A which excels both in

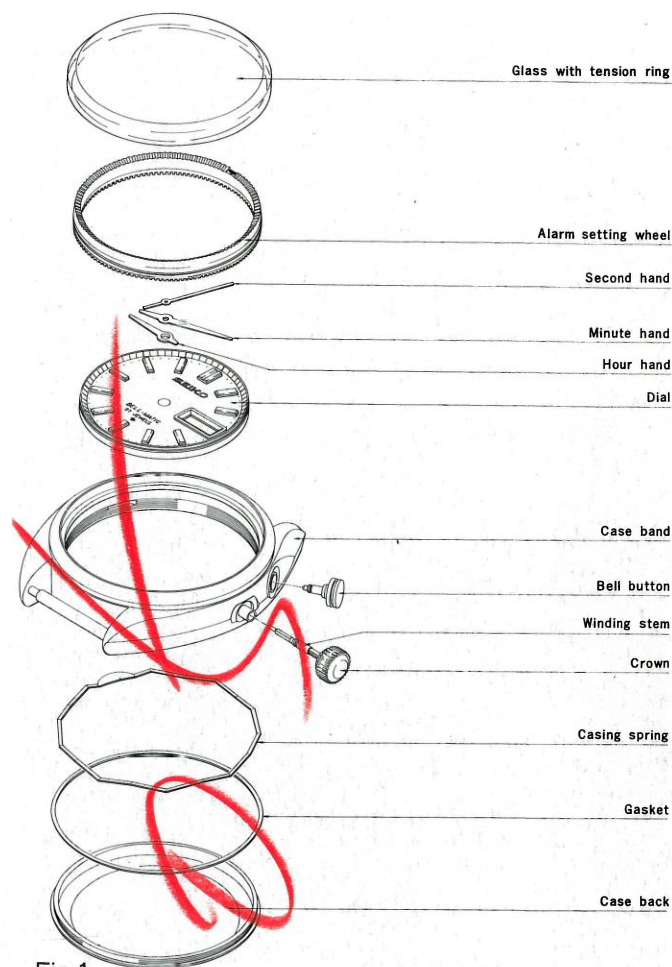


Fig. 1

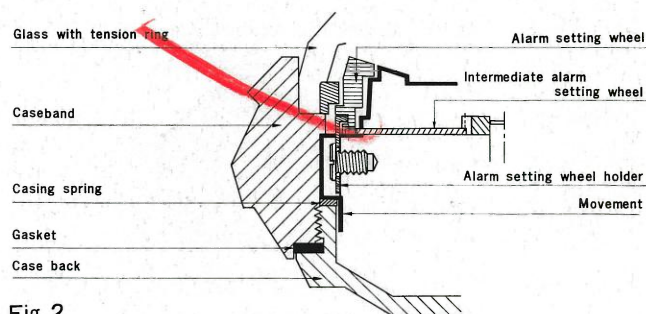


Fig. 2

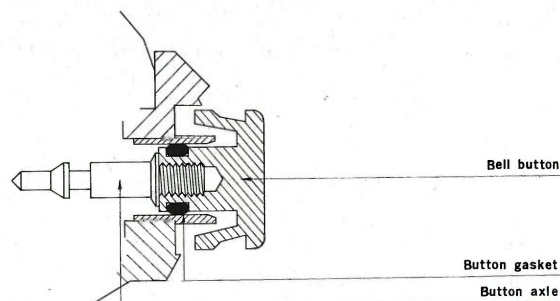


Fig. 3

design and function. The alarm setting wheel is secured to the movement through an alarm setting wheel holder, and it interlocks with the alarm setting train and crown. (Fig. 2)

3. Automatic winding mechanism

3-1. Exploded view of automatic winding mechanism (Fig. 4)

3-2. Transmission of force in automatic winding mechanism (Fig. 5)

- An eccentric pin in a ball bearing performs circular motions by right and left rotations of the oscillating weight.
- The pawl lever performs reciprocative motions due to circular movement of the eccentric pin, and the pawl lever rotates the transmission wheel constantly in one direction.
- This motion is transmitted to the ratchet wheel from the transmission wheel; thus, the mainspring is wound.
- Since a pawl lever is adopted, whose actions transmit right and left rotations of the oscillating weight in one direction—magnifying the rotating force—and prevent reversal motion of the mainspring, this automatic winding mechanism is extremely simplified.
- In addition to the simplified construction, all automatic winding parts are set on the framework for automatic device; as a result, disassembling and reassembling are extremely easy.

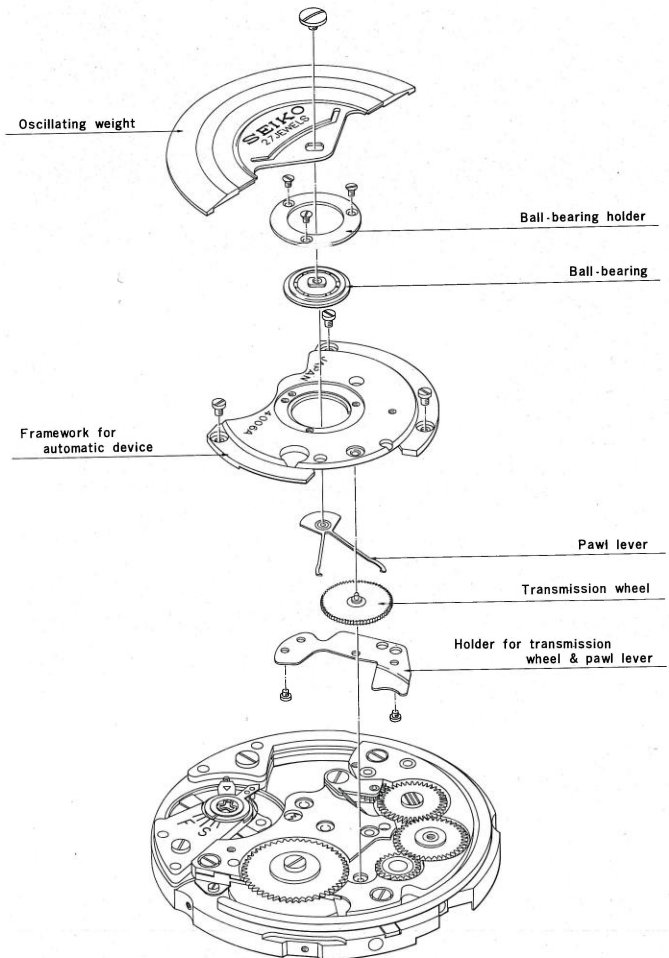


Fig. 4

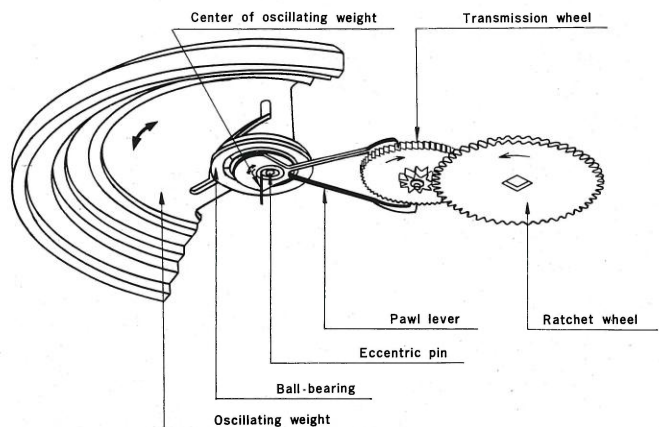
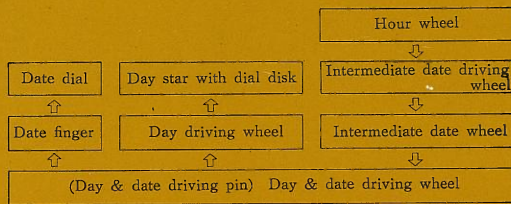


Fig. 5

4 Calendar and bell alarm mechanism

4-1. Exploded view of calendar and bell alarm mechanism (Fig. 6)

4-2. Mechanism of calendar device (Fig. 7)



4-3. Date setting (Fig. 8)

By depressing the bell button, the date corrector is actuated and the date dial driven.

Due to one-side free mechanism of the date finger, date correction through the button can be achieved even in a condition when the date finger is forwarding the date dial.

4-4. Day setting

Day setting can be performed by alternating the hands between 9 : 30 P.M. to 1 : 00 A.M. on the dial.

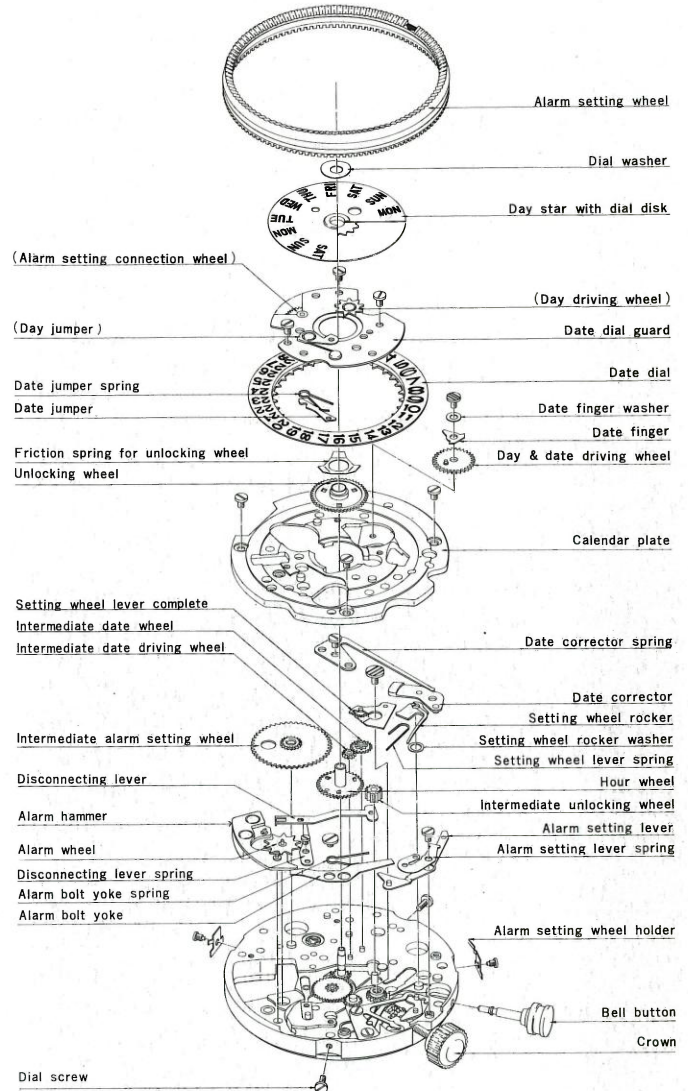


Fig. 6

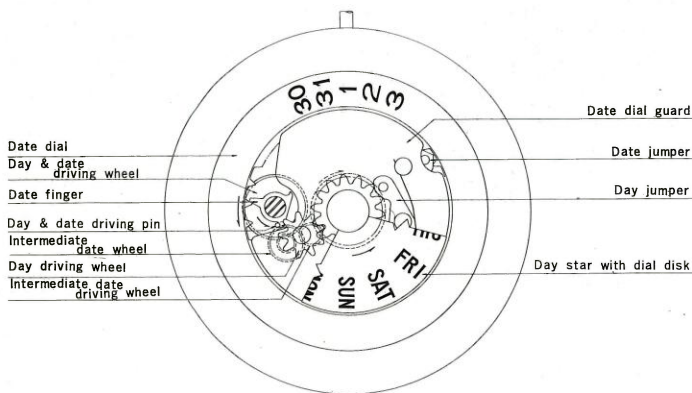


Fig. 7

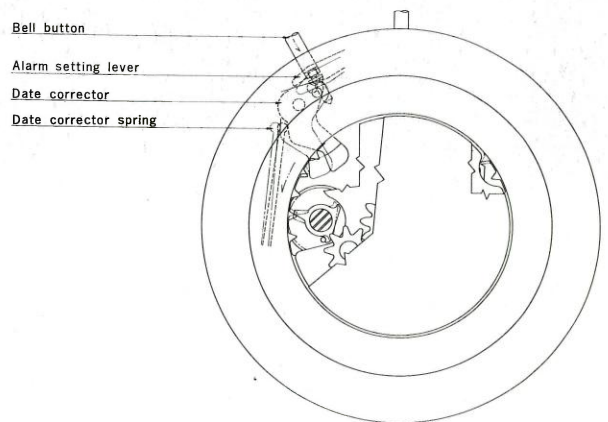


Fig. 8

4-5. Setting mechanism

The setting mechanism consists of the crown (three-position changeover) and bell button (two-position changeover and push).

Turning the hands (Fig. 9)

When the crown is pulled out to the third position, the yoke is pushed by the setting lever, meshing the clutch wheel and setting wheel.

At the same time, the setting wheel lever complete is pushed by the pin on the setting lever through the setting wheel rocker so that the intermediate setting wheel and the intermediate minute wheel are engaged. Therefore, by turning the crown hereon, force is transmitted in the sequence of clutch wheel→setting wheel→intermediate setting wheel→intermediate minute wheel→minute wheel→hour wheel•cannon pinion... thus turning the hands.

Winding the alarm mainspring

(Fig. 10, 11 & 12)

When the crown is under the first position, the clutch and the winding pinion are engaged with each other. By turning the crown, force is transmitted in the sequence of clutch wheel→winding pinion→crown wheel→intermediate winding wheel→alarm ratchet wheel...winding the alarm mainspring. (Fig. 10 & 11) If the bell button is pulled out, however, the yoke is pushed by the alarm setting lever; accordingly, under this condition the clutch wheel and winding pinion are disengaged, and the alarm mainspring is not wound. (Fig. 12) The intermediate wheel rocker for alarm serves as a click. When the spring is about to return (by force applied in the opposite direction indicated by the arrow mark), the alarm ratchet wheel and the alarm intermediate wheel are engaged with each other. This torque is transmitted in the sequence of the alarm intermediate wheel→alarm wheel→alarm hammer. Since the alarm hammer is stopped by the alarm bolt yoke, the spring remains wound. When winding the alarm mainspring, the intermediate wheel rocker spring for alarm will bend; consequently, the intermediate wheel and the alarm wheel are disengaged.

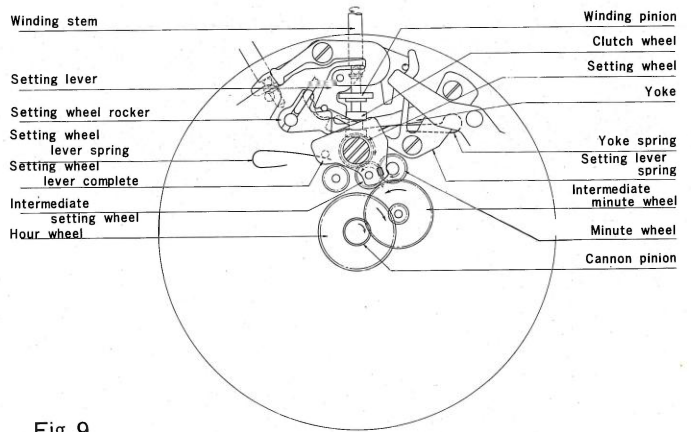


Fig. 9

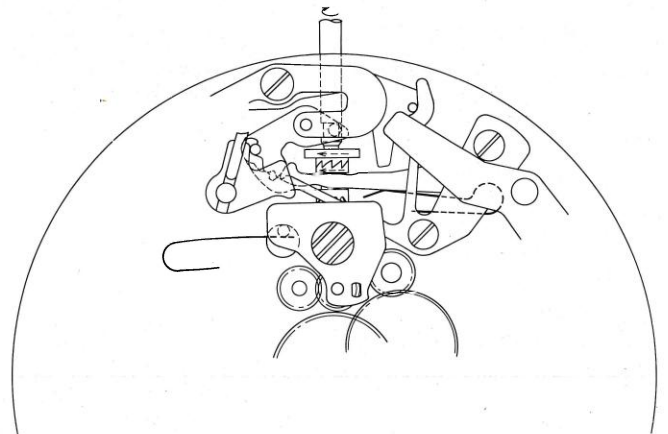


Fig. 10

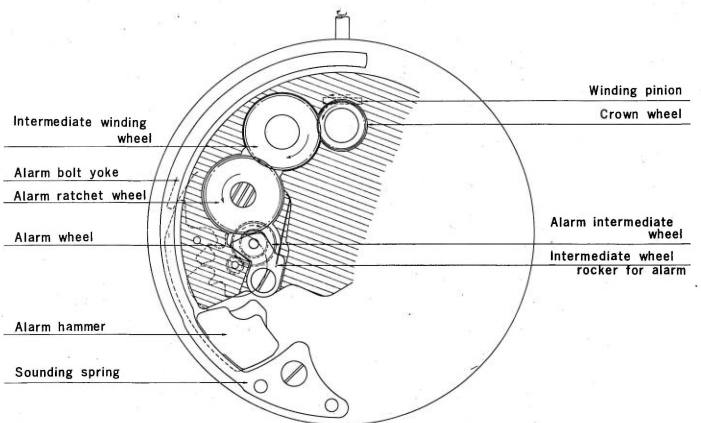


Fig. 11

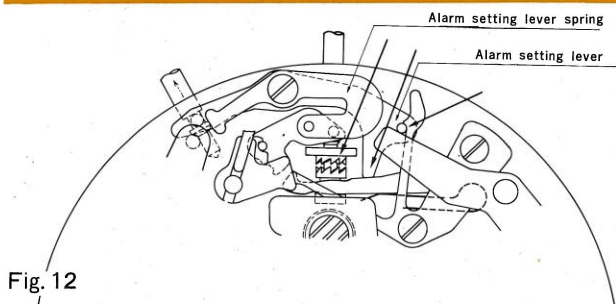


Fig. 12

Bell time setting (Fig. 13)

When the crown is pulled out to the second position, the yoke is pushed by the setting lever so that the clutch wheel and the setting wheel are meshed with each other. Under this condition, the setting wheel lever complete is held in a position shown in Fig. 13 by means of the setting lever spring, and the intermediate setting wheel is engaged with the intermediate unlocking wheel. Therefore, by turning the crown, torque is transmitted in the sequence of the clutch wheel→setting wheel→intermediate setting wheel→intermediate unlocking wheel...turning the unlocking wheel. Subsequently, torque is further transmitted in the sequence of the unlocking wheel→alarm setting connection wheel→intermediate alarm setting wheel...turning the alarm setting wheel. Under this condition, bell timing can be accurately set. The alarm setting wheel, interlocking with the unlocking wheel, serves to indicate the bell ringing position on the dial. The spring attached to the setting wheel rocker functions to press the alarm setting wheel as shown in Fig. 14 when the crown is depressed on completion of setting the bell time, preventing the alarm setting wheel from moving through receiving mechanical shocks.

Bell setting (Fig. 15)

When the bell button is pulled to the second position, the alarm setting lever is actuated, separating the alarm bolt yoke from the hammer; thus the bell is prepared for ringing. When the preset bell time arrives, the hammer is actuated and the bell rings. At this time, the alarm setting lever pushes the yoke, disengaging the winding pinion and the clutch wheel from each other. Therefore, the winding train wheel is reversed as far as the winding pinion. Until the bell ringing time arrives, the hammer is stopped by the disconnecting lever.

Ringing the bell (Fig. 16)

When the time indicated by the set mark is reached, the projection of the hour wheel is aligned with the unlocking wheel hole. Under this condition, the hour wheel and disconnecting lever are both raised by the disconnecting lever spring, resulting in separation of the disconnecting lever from the hammer. Then the hammer beats the sounding spring continuously, sounding the bell until the force of the alarm mainspring is expended.

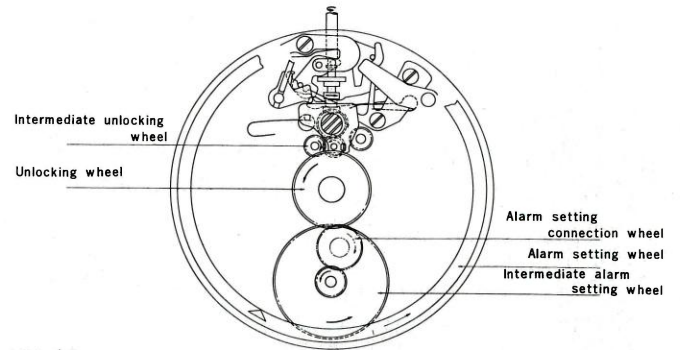


Fig. 13

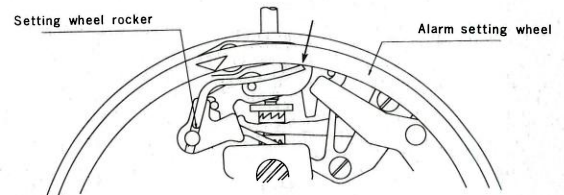


Fig. 14

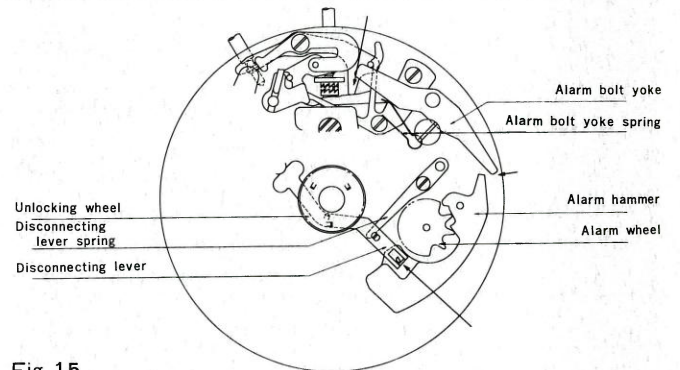


Fig. 15

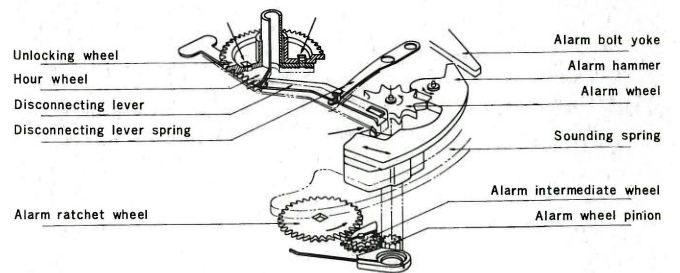


Fig. 16

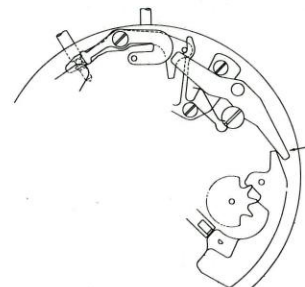


Fig. 17

Stopping the bell (Fig. 17)

When the bell button is pushed to the first position, the hammer is held by the alarm bolt yoke, stopping the bell from ringing.

5. Movement

Exploded view of movement

(Fig. 18 & 19)

6. Disassembly, assembly, and checking

Refer to the following pages.

4006A-7 ~ 4006A-17.

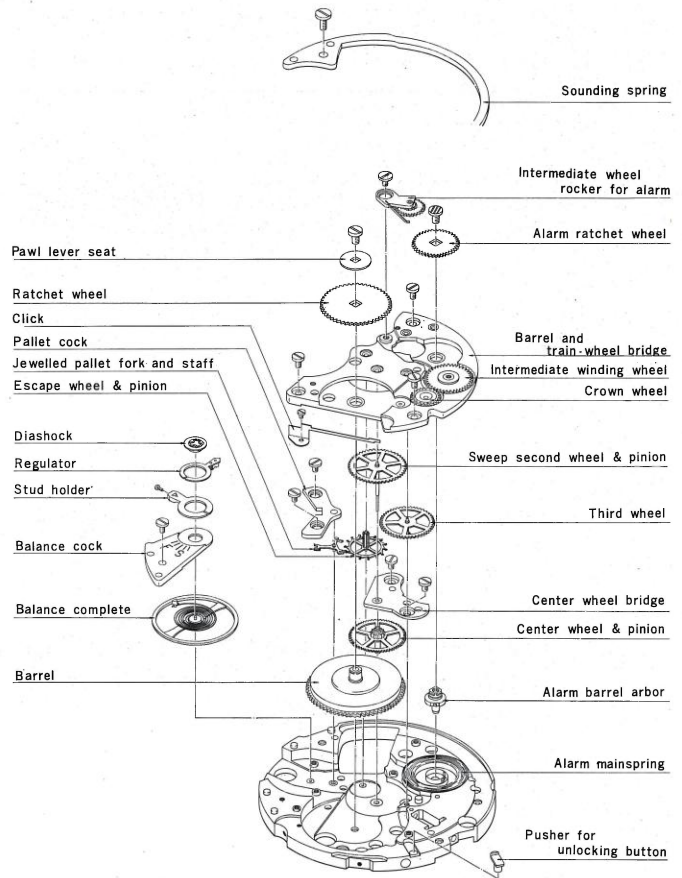


Fig. 18

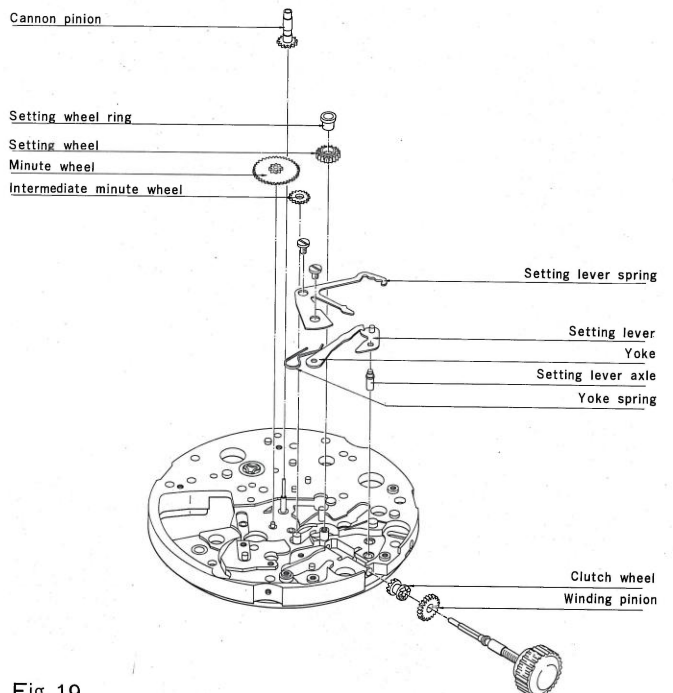

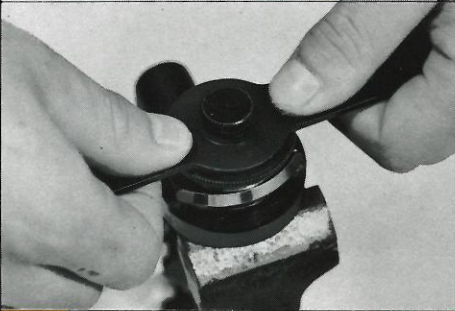
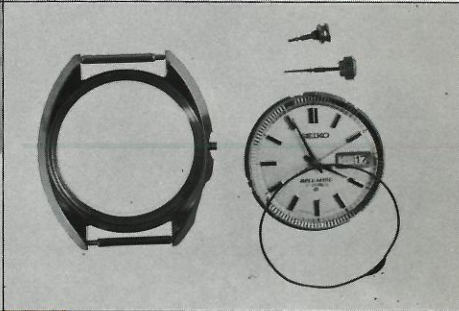
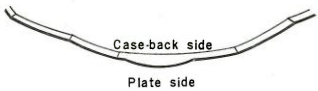
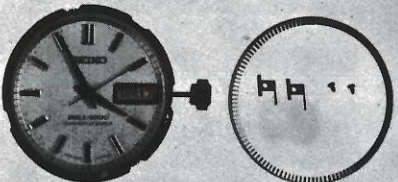
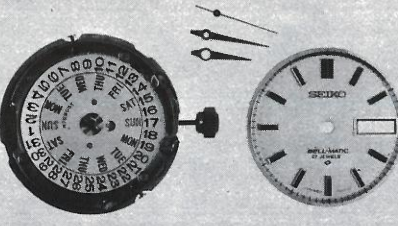



Fig. 19

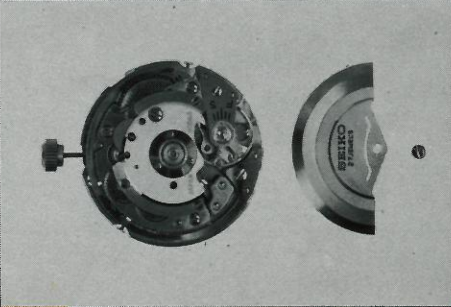
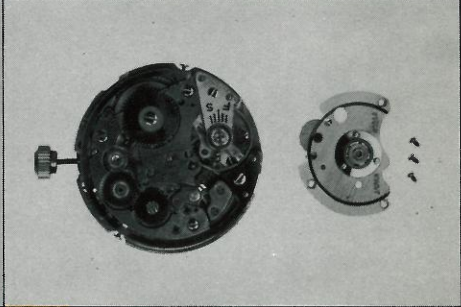
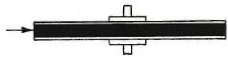
4006A Disassembly and assembly—continued

Disassembly	1	<p>CASE BACK</p> <ol style="list-style-type: none"> 1) Set case in case-holder held by vise 2) Remove case back with SEIKO case opener 3) Remove case back gasket <p>Concerning use of case-holder and opener, refer to item entitled Instruments for Repairing and Testing Machines.</p>	2
		<p>1) Remove case spring</p> <p>2) Remove bell button by pushing pusher for unlocking button</p> <p>3) Remove winding stem by pushing setting lever axle</p> <p>4) Turn case upside down and gently remove movement from case. Be careful not to deform case spring</p>	REMOVAL OF MOVEMENT
	Remark	<p>Usually there is no need of removing glass; however, when it is necessary to do so, remove glass by pushing it from inside. (It is not necessary to remove bezel.)</p>	
Photo			
Assembly	32	31	30
	CHECKING	CASE BACK	CASING
	<ol style="list-style-type: none"> 1) Space between hands 2) The position of crown 3) Rotation of hands 4) Positions of hour and minute hands at 12 o'clock 5) Date changes near midnight; day changes near 1 A.M. 6) Date setting 7) Bell time setting 8) Stopping the bell 9) Waterproof test 	<ol style="list-style-type: none"> 1) Thinly apply silicon grease (500,000 c.s.) to case back gasket 2) Mount case back gasket on case back 3) Assemble case back with case-holder and opener. Tighten case back securely and completely. 	<ol style="list-style-type: none"> 1) Remove winding stem and bell button 2) Insert movement in case 3) Apply silicon grease (500,000 c.s.) to crown gasket 4) Set winding stem 5) Apply silicon grease (500,000 c.s.) to bell button gasket 6) Set bell button 7) Align projection of casing spring with dented portion on the case (near balance wheel) and set casing spring (Refer to drawing to avoid confusing front and back)
Remark			

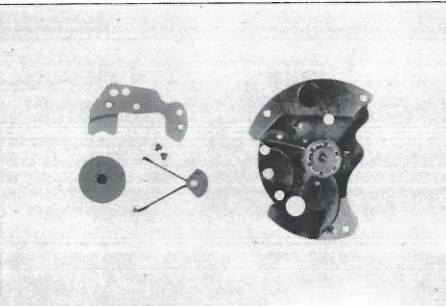
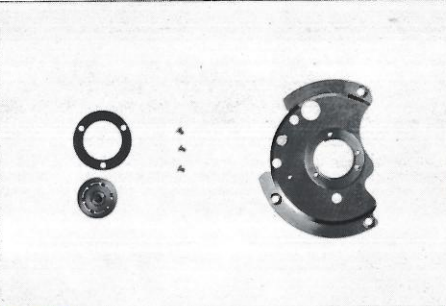
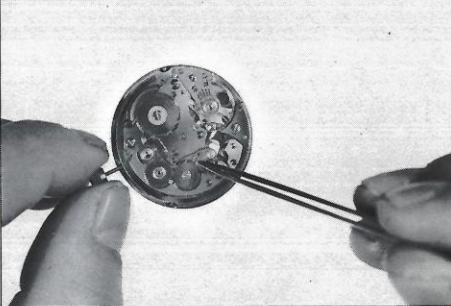
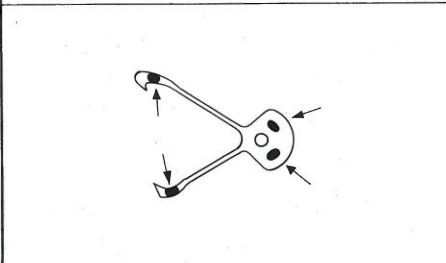
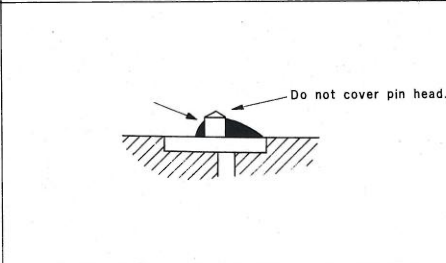
4006A Disassembly and assembly—continued

	3 ALARM SETTING WHEEL	4 DIAL	5 DAY STAR WITH DIAL DISK
Disassembly	<p>Method</p> <ol style="list-style-type: none"> 1) Set winding stem to facilitate disassembling (It can be set by merely inserting winding stem without pushing setting lever axle) 2) Remove alarm setting wheel holder screws (2 pcs.) 3) Remove alarm setting wheel holders 4) After pulling crown to second or third position, remove alarm setting wheel 	<ol style="list-style-type: none"> 1) Remove second hand, minute hand, and hour hand 2) Loosen dial screws and remove dial 	<ol style="list-style-type: none"> 1) Remove dial washer and day star with dial disk
Remark	<p>Setting wheel rocker spring is designed to project from periphery of plate; consequently, disassemble or reassemble watch very carefully. When crown is pulled to second or third position, spring withdraws.</p>		
Photo			
Assembly	<p>29 ALARM SETTING WHEEL</p> <ol style="list-style-type: none"> 1) Pull crown to third position and turn it, then set hands to 12 o'clock 2) Turn crown at second position, stopping crown at moment bell begins to ring. Then set alarm setting wheel in such a position that its set-mark is aligned with 12 o'clock 3) Set alarm setting wheel holders and screws while holding alarm setting wheel and intermediate alarm setting wheel in an engaged condition 4) Check bell ringing time and reset alarm setting wheel if too large an error of bell ringing time exists <p>(Normal tolerance : ± 5 minutes)</p>	<p>28 DIAL</p> <ol style="list-style-type: none"> 1) Set dial and tighten dial screws 2) Turn crown at third position, stop crown on moment when date dial is changed, and set hour hand and minute hand to 12 o'clock 3) When projection of hour wheel enters hole of unlocking wheel (bell ringing time), check clearance between hour hand and dial (As hands advance, one position is reached where hour hand is elevated to a higher position. Reverse hands therefrom and check hour hand and minute hand by setting one over the other) 4) Set second hand 	<p>27 DAY STAR WITH DIAL DISK</p> <ol style="list-style-type: none"> 1) Correct day jumper position 2) Set day star with dial disk (Mesh day star with day jumper head through hole of dial disk) 3) Set dial washer
Remark			<p>Proper height of dial washer is 0.25mm, equal to thickness of setting lever spring.</p>

4006A Disassembly and assembly—continued

Disassembly	6	OSCILLATING WEIGHT	7	
		<ol style="list-style-type: none"> 1) Remove screw for oscillating weight 2) Remove oscillating weight 	<ol style="list-style-type: none"> 1) Remove framework screws for automatic device (3 pcs.) 2) Remove framework for automatic device 	
	Method			
Remark				
Photo				
Assembly	26	25	24	
	INSPECTION	OSCILLATING WEIGHT	FRAMEWORK FOR AUTOMATIC DEVICE	
	<ol style="list-style-type: none"> 1) Make sure that pawl lever is correctly engaged with transmission wheel 2) Check automatic winding operating conditions 3) Inspect overall movement 	<ol style="list-style-type: none"> 1) Set oscillating weight and screw for oscillating weight 	<ol style="list-style-type: none"> 1) Lubricate upper and lower hole jewels of transmission (watch oil S-4 or Moebius grease "Remontoires") 2) Ascertain that transmission wheel is engaged with ratchet wheel and tighten framework screws for automatic device (Confirm by turning ratchet wheel) 3) Lubricate transmission wheel tooth surface (watch oil S-4 or Moebius grease "Remontoires") 	
Method				
Remark		<p>Tighten screw for oscillating weight securely. Check contacting conditions with sounding spring.</p>		

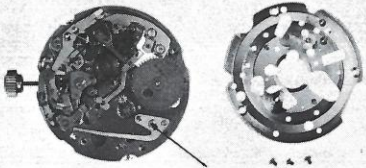
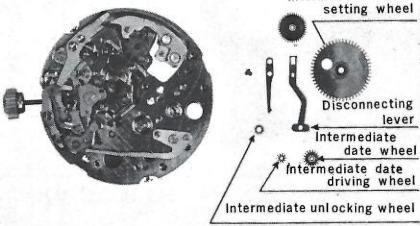
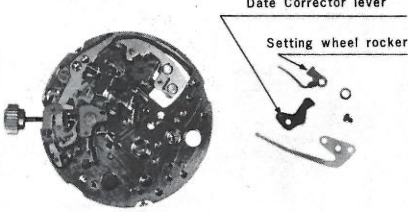

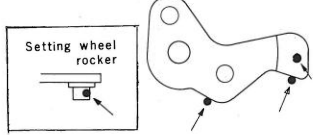
4006A Disassembly and assembly—continued

	8	9	10
Disassembly	TRANSMISSION WHEEL	BALL-BEARING	ALARM MAINSPRING
Method	<ol style="list-style-type: none"> 1) Remove holder screws for transmission wheel and pawl lever (2 pcs.) 2) Remove holder for transmission wheel and pawl lever 3) Remove transmission wheel and pawl lever 	<ol style="list-style-type: none"> 1) Remove ball-bearing holder screws (3 pcs.) 2) Remove ball-bearing holder. 3) Remove ball-bearing. 	<ol style="list-style-type: none"> 1) Disengage alarm intermediate wheel and alarm wheel pinion with a pair of tweezers (by turning intermediate wheel rocker for alarm clockwise); then unwind alarm mainspring slowly by operating crown (see photo) or by ringing bell
Remark	Be careful not to deform pawl lever.	Ball-bearing cannot be disassembled.	
Photo			
Assembly	23	22	21
Method	<ol style="list-style-type: none"> 1) Lubricate pawl lever (watch oil S-4 or Moebius grease "Remontoires") 2) Set transmission wheel 3) Set pawl lever and mesh it with transmission wheel 4) Set holder for transmission wheel and pawl lever, and holder screws for transmission wheel and pawl lever 	<ol style="list-style-type: none"> 1) Set ball-bearing, ball-bearing holder, and ball-bearing holder screws 2) Lubricate each ball in ball-bearing with Moebius Synt-A-Lube 3) Lubricate eccentric pin (watch oil S-4); See remarks below 	<ol style="list-style-type: none"> 1) Wind alarm mainspring and pull out bell button. Turn crown at second position, making sure that bell rings when projections of hour wheel fit in holes of unlocking wheel 2) Check date correction and date driving conditions
Remark			

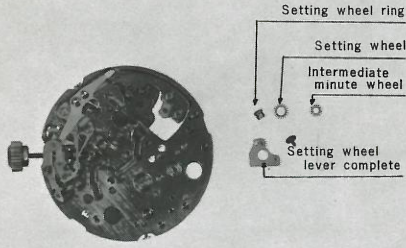
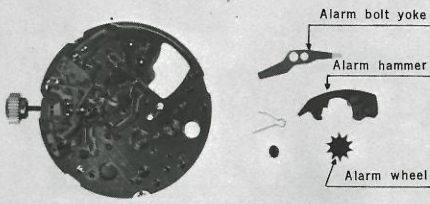
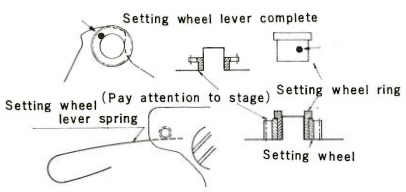
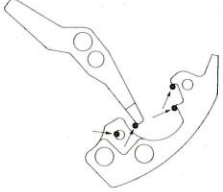
4006A Disassembly and assembly—continued

	11	12	13
Disassembly	DATE DIAL	HOUR WHEEL	DAY & DATE DRIVING WHEEL
Method	<ol style="list-style-type: none"> 1) Remove date dial guard screws (3 pcs.) 2) Remove date dial guard 3) Remove date jumper spring and date jumper 4) Remove date dial 	<ol style="list-style-type: none"> 1) Remove friction spring for unlocking wheel 2) Remove unlocking wheel 3) Remove hour wheel 	<ol style="list-style-type: none"> 1) Remove screw for day and date driving wheel 2) Remove date finger washer, date finger, and day & date driving wheel
Remark			Because it has left-handed threads, loosen screw for day & date driving wheel by turning it to the right.
Photo			
Assembly	20	19	18
Method	<ol style="list-style-type: none"> 1) Lubricate date dial contacting part of calendar plate (Moebius Synt-A-Lube) 2) Lubricate alarm setting connection wheel on back side of date dial guard (Moebius Synt-A-Lube) 3) Set date dial 4) Lubricate engaging part between date jumper and date dial (Moebius Synt-A-Lube) 5) Set date jumper and date jumper spring 6) Set date dial guard and screws 	<ol style="list-style-type: none"> 1) Lubricate upper and lower pivot of alarm wheel and alarm hammer (watch oil S-4 or Moebius grease "Remontoires") 2) Lubricate cannon pinion (Moebius Synt-A-Lube) 3) Lubricate hour wheel (Moebius Synt-A-Lube) 4) Set hour wheel 5) Lubricate unlocking wheel with watch oil S-4 or Moebius grease "Remontoires" 6) Set unlocking wheel 	<ol style="list-style-type: none"> 1) Lubricate day & date driving wheel axle (Moebius Synt-A-Lube) 2) Set day & date driving wheel 3) Set date finger 4) Set date finger washer (open downward) 5) Set the screw for day and date driving wheel (tighten by turning to left)
Remark			Be sure to position date finger against day driving pin correctly (refer to photo of Hour Wheel)

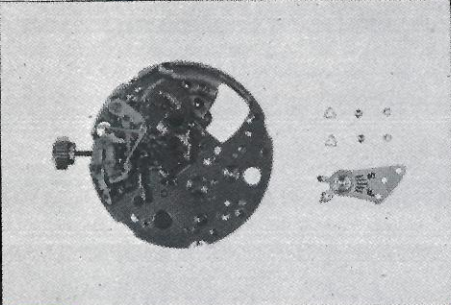
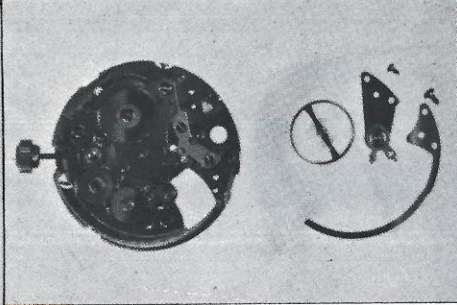
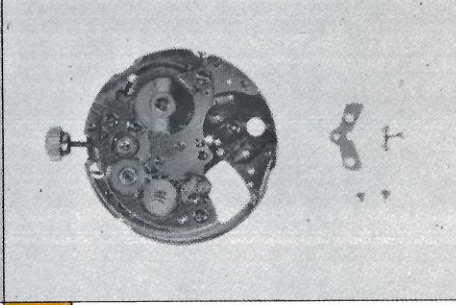
4006A Disassembly and assembly—continued

Disassembly	14	CALENDAR PLATE	15
	Method	<ol style="list-style-type: none"> 1) Remove calendar plate screws (3 pcs.) 2) Remove calendar plate 	<ol style="list-style-type: none"> 1) Remove intermediate alarm setting wheel 2) Remove intermediate date wheel 3) Remove intermediate date driving wheel 4) Remove disconnecting lever 5) Remove disconnecting lever spring screw 6) Remove disconnecting lever spring 7) Remove minute wheel 8) Remove intermediate unlocking wheel
Remark	Do not inadvertently remove the screw indicated by arrow in photo. It is date corrector spring screw. Intermediate date driving wheel and intermediate unlocking wheel are often removed together with calendar plate.		
Photo			
Assembly	17	CALENDAR PLATE	16
	Method	<ol style="list-style-type: none"> 1) Set calendar plate and its screws 2) Check bell for ringing conditions. Wind alarm mainspring with crown, ascertaining that bell rings when bell button is pulled out to second position. If bell does not ring, check disconnecting lever or alarm train. 	<ol style="list-style-type: none"> 1) Lubricate intermediate unlocking wheel axle and minute wheel axle (Moebius Synt-A-Lube) 2) Set intermediate unlocking wheel 3) Set minute wheel 4) Lubricate intermediate date driving wheel axle, intermediate date wheel axle, and alarm setting connection wheel axle (Moebius Synt-A-Lube) 5) Set intermediate date driving wheel, intermediate date wheel, and intermediate alarm setting wheel 6) Set disconnecting lever spring and its screw 7) Lubricate disconnecting lever (watch oil S-4) 8) Set disconnecting lever
Remark			

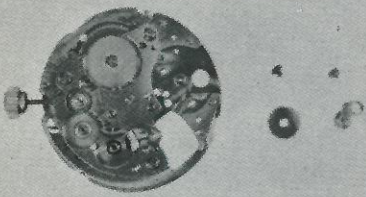
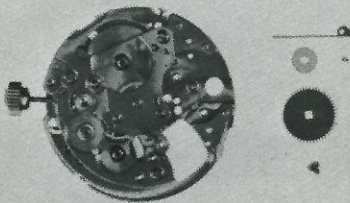
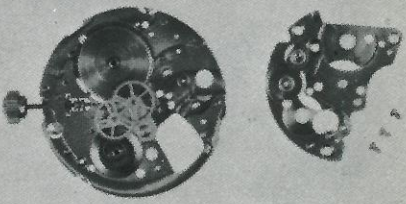
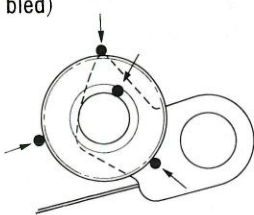
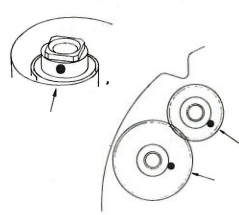
4006A Disassembly and assembly—continued

	17	18	19
Disassembly	SETTING WHEEL LEVER COMPLETE	ALARM HAMMER	UNWINDING MAINSPRING
Method	<ol style="list-style-type: none"> 1) Remove setting wheel lever screw 2) Remove setting wheel lever complete 3) Remove setting wheel lever spring 4) Remove setting wheel ring and setting wheel 5) Remove intermediate minute wheel 	<ol style="list-style-type: none"> 1) Remove alarm wheel 2) Remove alarm hammer 3) Remove alarm bolt yoke spring 4) Remove alarm bolt yoke screw 5) Remove alarm bolt yoke 	
Remark	Because it has left-handed threads, loosen setting wheel lever screw by turning it to right.		When unwinding mainspring, let it unwind solely by its returning force.
Photo			
Assembly	14	13	12
Method	<ol style="list-style-type: none"> 1) Lubricate setting wheel ring and intermediate minute wheel axle (Moebius Synt-A-Lube) 2) Set setting wheel and setting wheel ring 3) Set intermediate minute wheel 4) Lubricate setting wheel lever complete (Moebius Synt-A-Lube) 5) Set setting wheel lever complete 6) Set setting wheel lever screw (tighten by turning to left) 7) Ascertain that setting wheel lever complete moves to right and left smoothly 8) Set setting wheel lever spring 	<ol style="list-style-type: none"> 1) Lubricate alarm bolt yoke axle (watch oil S-4) 2) Lubricate alarm bolt yoke (watch oil S-4) 3) Set alarm bolt yoke 4) Set alarm bolt yoke screw (confirm mounting position by referring to 14) 5) Set alarm bolt yoke spring 6) Set alarm wheel 7) Lubricate alarm hammer (watch oil S-4 or Moebius grease "Remontoires") 8) Set alarm hammer 	<ol style="list-style-type: none"> 1) Check condition of hairspring 2) Wind spring fully Hold movement vertical and check amplitude making sure that amplitude is 180° or larger (spring can be fully wound by turning ratchet wheel 8 or more times)
Remark			

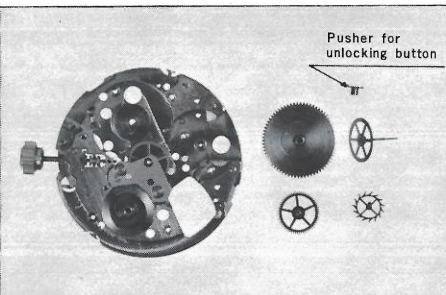
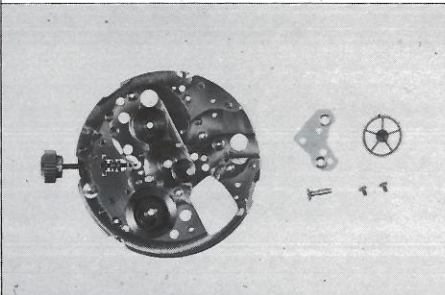

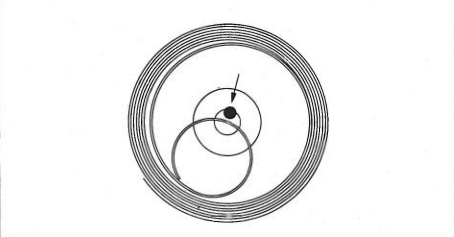
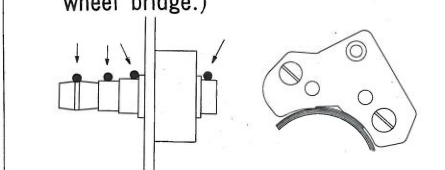
4006A Disassembly and assembly—continued

		20	21	22
Disassembly	Method	BALANCE COMPLETE 1) Remove sounding spring screw 2) Remove sounding spring 3) Remove balance cock screw 4) Remove balance cock 5) Loosen stud screw and remove stud from stud holder 6) Remove balance by turning regulat key	DIASHOCK 1) Remove Diashock springs from plate and balance cock 2) Remove cap jewel and hole jewel with frame, cleaning them with benzine or trichlorethylene	PALLET 1) Remove pallet cock screws (2 pcs.) 2) Remove pallet cock 3) Remove pallet
	Remark	Pay attention to any deformation of sounding spring.	Wash with fresh cleaning solution using a brush.	
	Photo			
Assembly	Method	11 BALANCE COMPLETE 1) Set balance on balance cock 2) Place hairspring on regulator key and turn key 3) Tighten stud to stud holder with a screw. Flush upper surfaces of stud head and stud holder 4) Set balance cock and its screw 5) Set sounding spring and its screw	10 DIASHOCK 1) Place cap jewel with flat surface upward 2) Put drop of oil on its center, holding cap jewel with tweezers. Extent of lubrication : Dia. of hole jewels. Max. 1/2 Min. 1/3 3) Set Diashock frame with hole jewel directly over oiled cap jewel	9 PALLET 1) Lubricate pallet jewels with Moebius Synt-A-Lube 2) Set pallet 3) Set pallet cock and screws 4) Check end shake of pallet
	Remark	Check sounding spring and plate for contacting condition. (If sounding spring contacts something, a proper sound will not result.)	Lubricating Diashock: For assembling it in plate, refer to item on Diashock.	

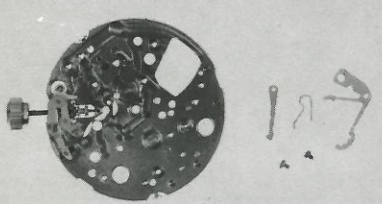
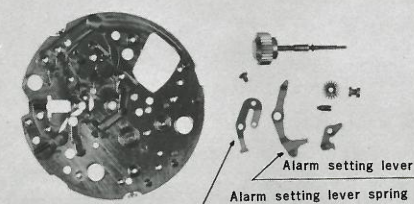
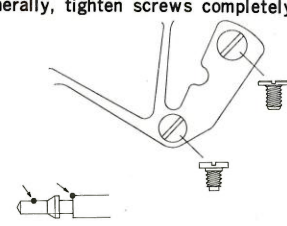
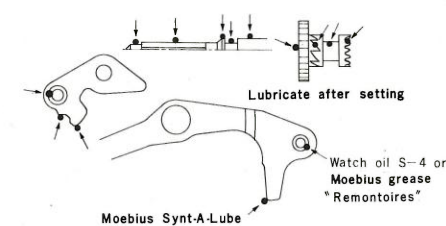
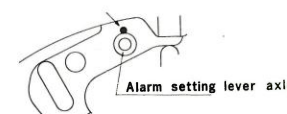
4006A Disassembly and assembly—continued

	23	24	25
Disassembly	ALARM RATCHET WHEEL	RATCHET WHEEL	BARREL AND TRAIN-WHEEL BRIDGE
	<p>Method</p> <ol style="list-style-type: none"> 1) Remove alarm ratchet wheel screw 2) Remove alarm ratchet wheel 3) Remove intermediate wheel rocker screw for alarm 4) Remove intermediate wheel rocker for alarm 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove ratchet screw 2) Remove pawl lever seat and ratchet wheel 3) Remove click screw 4) Remove click 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove bridge screws (3 pcs.) 2) Remove barrel and train wheel bridge
Remark	<p>Because it has left-handed threads, loosen alarm ratchet wheel screw by turning it to the right. Pay attention to any deformation of spring of intermediate wheel rocker for alarm.</p>		<p>Do not disassemble crown wheel and intermediate winding wheel from the bridge. Remove barrel and train wheel bridge while holding alarm barrel arbor so that alarm mainspring does not project.</p>
Photo			
Assembly	8	7	6
	ALARM RATCHET WHEEL	RATCHET WHEEL	BARREL AND TRAIN-WHEEL BRIDGE
Method	<ol style="list-style-type: none"> 1) Lubricate tube for intermediate wheel rocker for alarm (Moebius Synt-A-Lube) 2) Sufficiently lubricate alarm intermediate wheel (Moebius Synt-A-Lube) 3) Set intermediate wheel rocker for alarm and its screw 4) Set alarm ratchet wheel and alarm ratchet wheel screw (tighten screw by turning it to the left) 5) Check winding process of alarm mainspring by turning crown (Crown can be reversed since hammer portion is not assembled) 	<ol style="list-style-type: none"> 1) Set click and click screw 2) Set ratchet wheel, pawl lever seat, and ratchet wheel screw 3) Check condition of train wheels 	<ol style="list-style-type: none"> 1) Lubricate alarm barrel arbor upper pivot (watch oil S-4 or Moebius grease "Remontoires") 2) Set barrel and train-wheel bridge and its screws 3) Sufficiently lubricate crown wheel and intermediate winding wheel axle (Moebius-Synt-A-Lube) 4) Lubricate third wheel, sweep second wheel & pinion, and escape wheel pivots (Moebius Synt-A-Lube)
Remark			

4006A Disassembly and assembly—continued

Disassembly	26	TRAIN-WHEELS	27
	<ol style="list-style-type: none"> 1) Remove escape wheel, sweep second wheel & pinion, third wheel, and barrel 2) Remove pusher for unlocking button 		<ol style="list-style-type: none"> 1) Remove alarm barrel arbor while holding alarm mainspring so that it does not project
			<p>There is no need of removing alarm mainspring because it is self-greasing spring. (Spring assembled in plate does not project even when washed with ultrasonic cleaner.)</p>
Photo			28
			CENTER WHEEL & PINION
			<ol style="list-style-type: none"> 1) Remove cannon pinion 2) Remove center wheel bridge screws (2 pcs.) 3) Remove center wheel bridge 4) Remove center wheel & pinion
			
Assembly	5	TRAIN-WHEELS	4
	<ol style="list-style-type: none"> 1) Lubricate barrel (Moebius grease "Remontoires" or S-4) 2) Set barrel, third wheel, and escape wheel 3) Lubricate sweep second portion of jewel for center wheel (Moebius Synt-A-Lube) 4) Lubricate lower pivot of sweep second pinion with Moebius Synt-A-Lube) 5) Set sweep second wheel 6) Lubricate pusher for unloking button (Moebius Synt-A-Lube) 7) Set pusher for unlocking button, directing protruded portion inside 		<ol style="list-style-type: none"> 1) Lubricate pivot hole under alarm barrel arbor (Moebius grease "Remontoires") 2) Set alarm barrel arbor
			
Remark			3
			CENTER WHEEL & PINION
			<ol style="list-style-type: none"> 1) Lubricate center wheel & pinion (Moebius grease "Remontoires") 2) Set center wheel and pinion 3) Set center wheel bridge and center wheel bridge screws (2 pcs.) 4) Set cannon pinion
			<p>When setting center wheel bridge, pay attention to contact portion with alarm mainspring. (Hold end of alarm mainspring to side of center wheel bridge.)</p> 

4006A Disassembly and assembly—continued

	29	30	31
Disassembly	YOKE	ALARM SETTING LEVER	CLEANING
Method	<ol style="list-style-type: none"> 1) Remove setting lever spring screws (2 pcs.) 2) Remove setting lever spring 3) Remove yoke spring 4) Remove yoke 	<ol style="list-style-type: none"> 1) Remove alarm setting lever spring screw 2) Remove alarm setting lever spring 3) Remove alarm setting lever 4) Remove setting lever 5) Remove setting lever axle 6) Remove winding stem, clutch wheel, and winding pinion 	<p>Check and clean all parts so far disassembled. (For further particulars see the item on Cleaning.)</p>
Remark			
Photo			
Assembly	2	1	
Method	<ol style="list-style-type: none"> 1) Set yoke 2) Set yoke spring 3) Set setting lever spring and its screws 4) Lubricate the axle of the bell button (watch oil S-4 or Moebius grease "Remontoires") 5) Set bell button (Button can be set by merely depressing it) 	<ol style="list-style-type: none"> 1) Lubricate winding stem, winding pinion, and clutch wheel with Moebius Synt-A-Lube, then set them to plate 2) Set setting lever axle 3) Lubricate setting lever with watch oil S-4 or Moebius Synt-A-Lube 4) Lubricate alarm setting lever axle with watch oil S-4 or Moebius grease "Remontoires" 	<ol style="list-style-type: none"> 5) Lubricate alarm setting lever with watch oil S-4 and set it 6) Set alarm setting lever spring 7) Set alarm setting lever spring screw
Remark	<p>Generally, tighten screws completely</p> 		 <p>Make head of alarm setting lever screw completely free from burr.</p>

(1) Specifications

Casing diameter	25.60mm
Height	3.95mm
Vibrations per hour	28,800
Automatic winding (with auxiliary hand winding device)	
Calendar (day & date, Bilingual change-over mechanism for day indication; instant day & date setting device).	
Second-setting device	
Micro-adjustor (Outer-micro adjusting device for one-piece water resistant case)	

(2) Features

Watch movement designed with slim lines despite many functions. High beat mechanism (8 vibrations per second) assures excellent accuracy.

Instant day and date setting device is easily manipulated by revolving the crown.

Either one of two languages for day indication selectable through change-over mechanism.

(3) Disassembling and assembling

Disassemble the watch according to the procedures in Figs. 1 to 65.

Assemble the watch according to the procedures in Figs. 65 to 1.

(4) Lubrication

Colored marks in the illustrated figures indicate the types of oil, its quantities to be applied, and lubrication points.

Oil types

- Moebius Synt-A-Lube
- SEIKO Watch oil S-4
- SEIKO Watch oil S-3

Oil quantity

- Sufficient quantity
- Normal quantity
- Extremely small quantity



Movement

(5) Precautions on Handling the Watch

- 1) Correct the date approximately between 3:45 A.M. and 9:00 P.M.; also perform the day setting and bilingual changing approximately between 7:00 A.M. and 11:00 P.M. During periods other than the above-mentioned, these devices cannot be operated.
- 2) The mainspring is wound automatically; however, it can also be wound through the crown. When the date is corrected, the mainspring is wound at the same time.
- 3) Crown

The crown has three-stage change-over system.

Crown normal position – Winding the mainspring

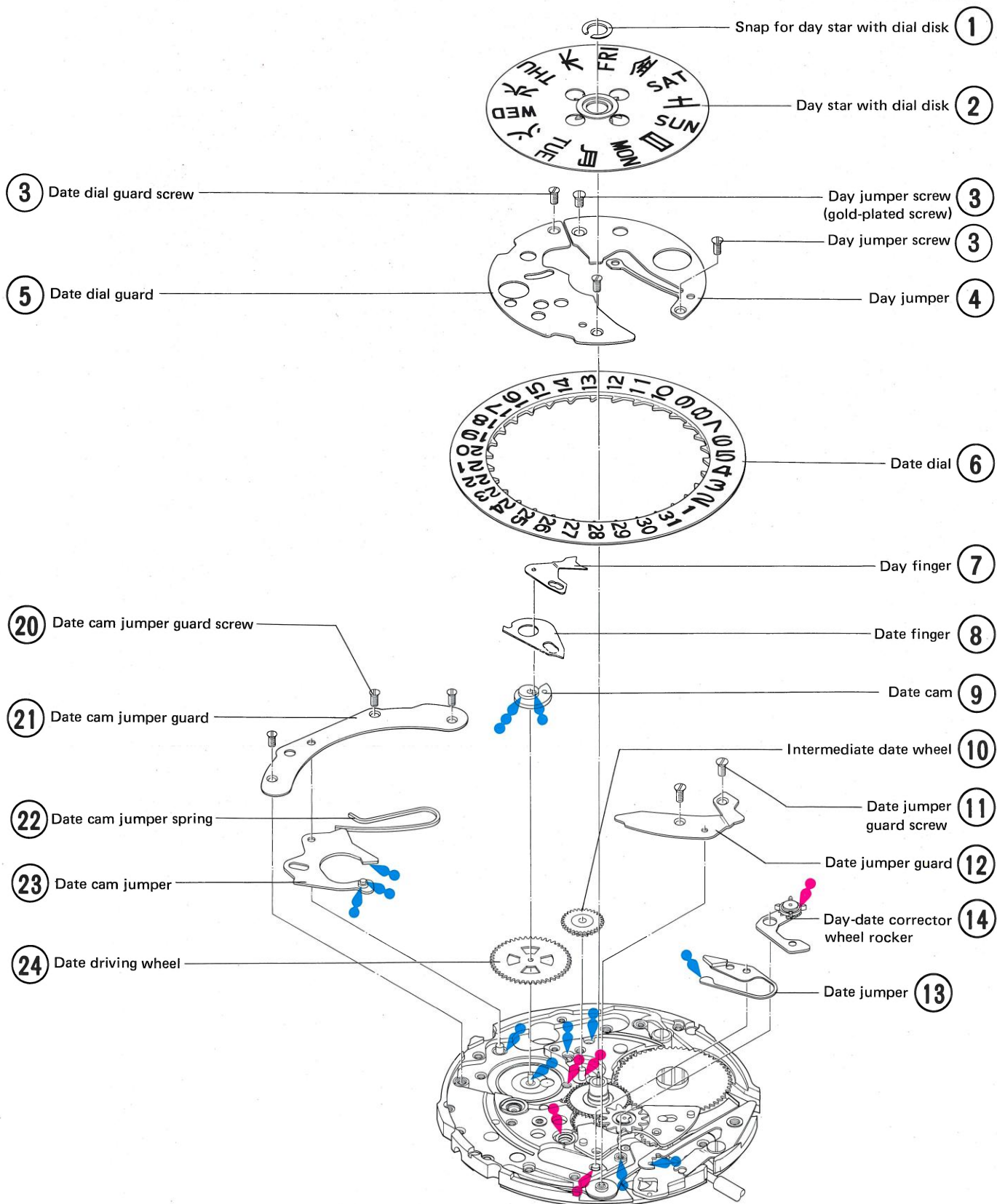
first click – Correcting the date (clockwise)

Correcting the day (counterclockwise)

Winding the mainspring

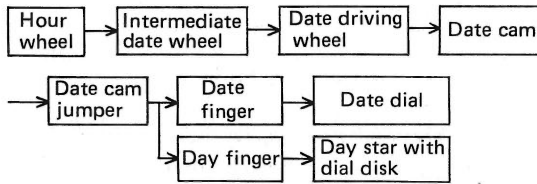
second click – Setting the hands and second setting

5206A Calendar Mechanism



(6) Calendar Mechanism

6-1 Instant day and date setting device (Figs. 1 and 2)



The date cam is assembled on the date driving wheel which revolves once for 24 hours. Date finger forwarding the date dial located on the date cam, and on the date finger, the day finger is assembled. The date cam jumper is always pressed against the date cam by a spring. When the date driving wheel revolves, the date cam is simultaneously rotated, and the date cam jumper contacting the date cam is raised through the spirally shaped circumference of the cam; at the same time, the date cam jumper spring is bent. When the date cam jumper passes the top of the cam, the date cam and the date cam jumper are revolved by force of the date cam jumper spring. At this time, the cam and the date cam jumper drive the date finger and the day finger.

Since these motions occur instantaneously, the end of the date finger forwards the date dial one day and the tip of the day finger advances the day star one day instantaneously.

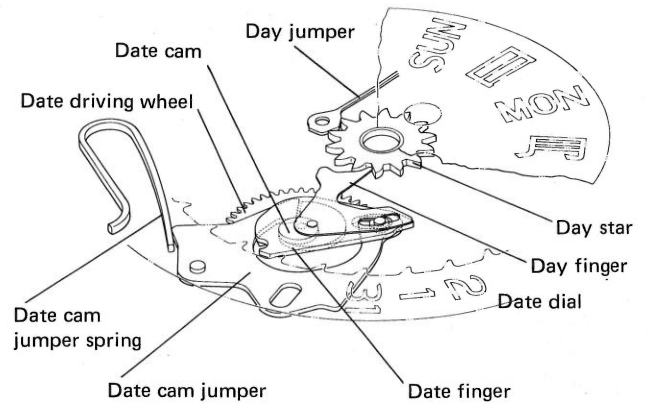


Fig. 1

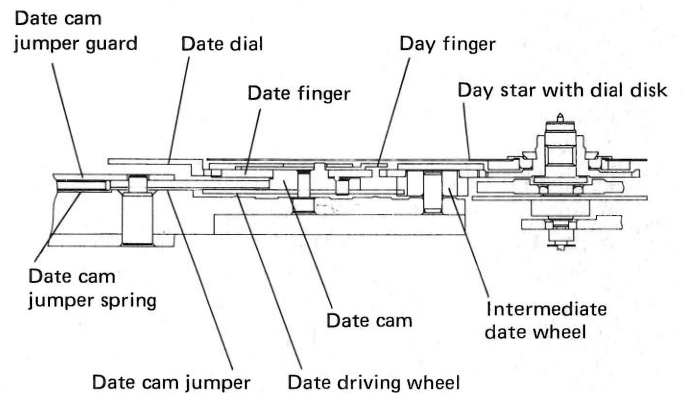


Fig. 2

(Before forwarding day and date)

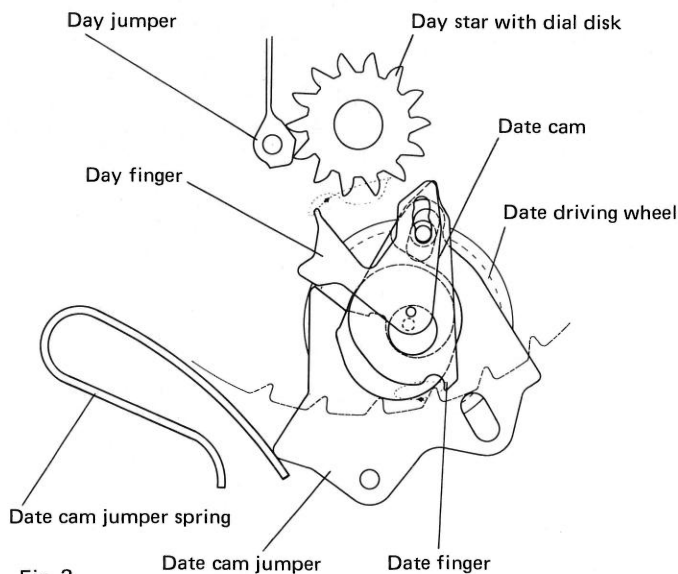


Fig. 3

(After forwarding day and date)

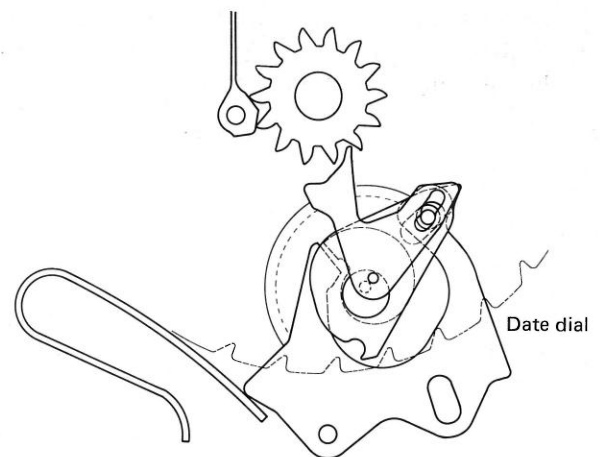
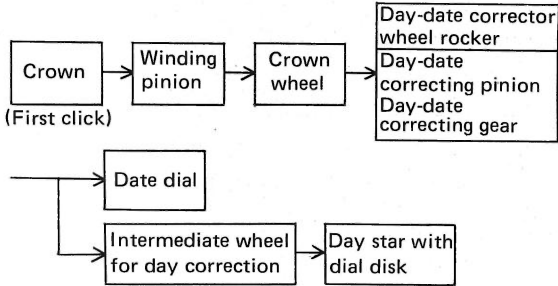


Fig. 4

5206A Calendar Mechanism

6)-2 Day and date correcting device (First click of Crown)



Date correction

The winding pinion and the crown wheel are meshed (they are assembled on the minute wheel bridge). When turning the crown clockwise, the day-date correcting gear attached to the day-date corrector wheel rocker meshes with the date dial, turning it as shown in Fig. 6.

(The mainspring can also be wound during the date correction by the crown).

Day correction

When turning the crown counterclockwise, the day-date corrector gear attached to the day-date correction wheel rocker meshes with the intermediate wheel for the day correction, turning the day star with dial disk.

Slipping of the day-date correcting gear

As shown in Fig. 4, when the tip of the date finger is between teeth of the date dial, or when the tip of the day finger is between the teeth of the day star, the correcting mechanism will not operate even when attempting to perform the day and date correction, due to slip of the day-date correcting gear.

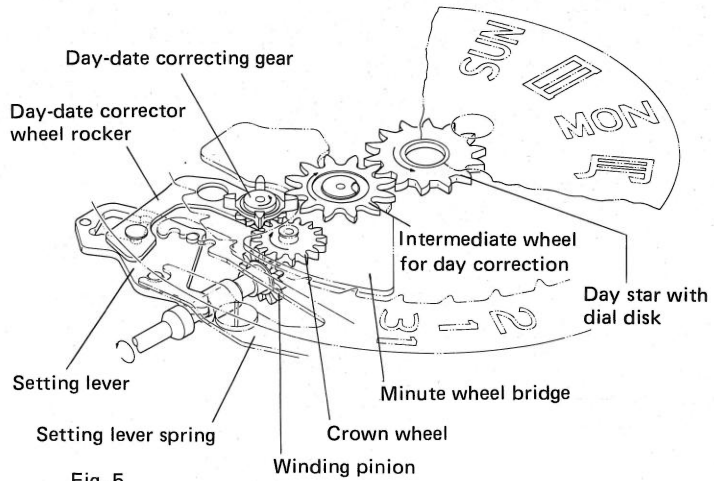


Fig. 5

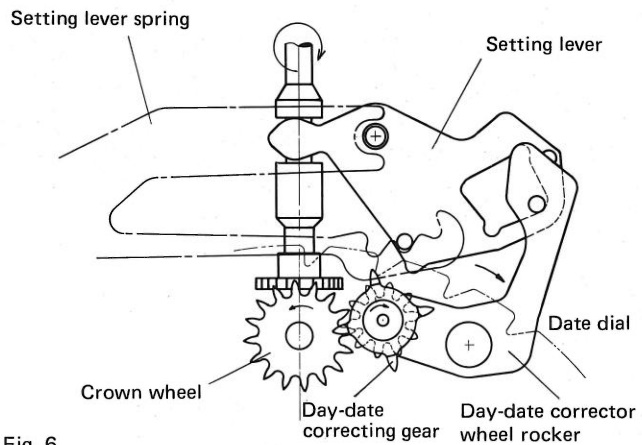


Fig. 6

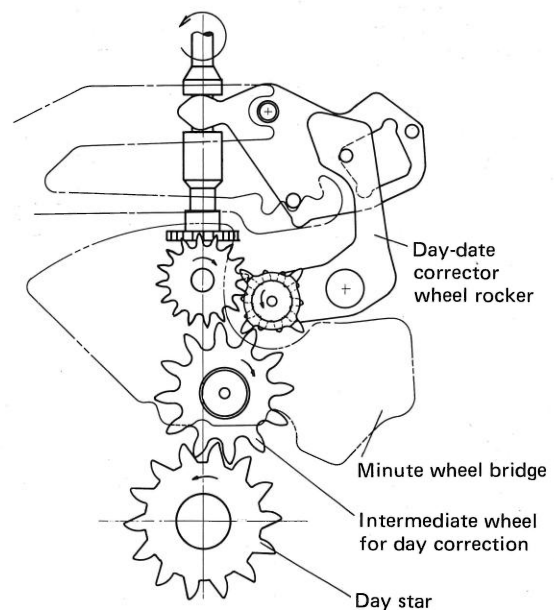
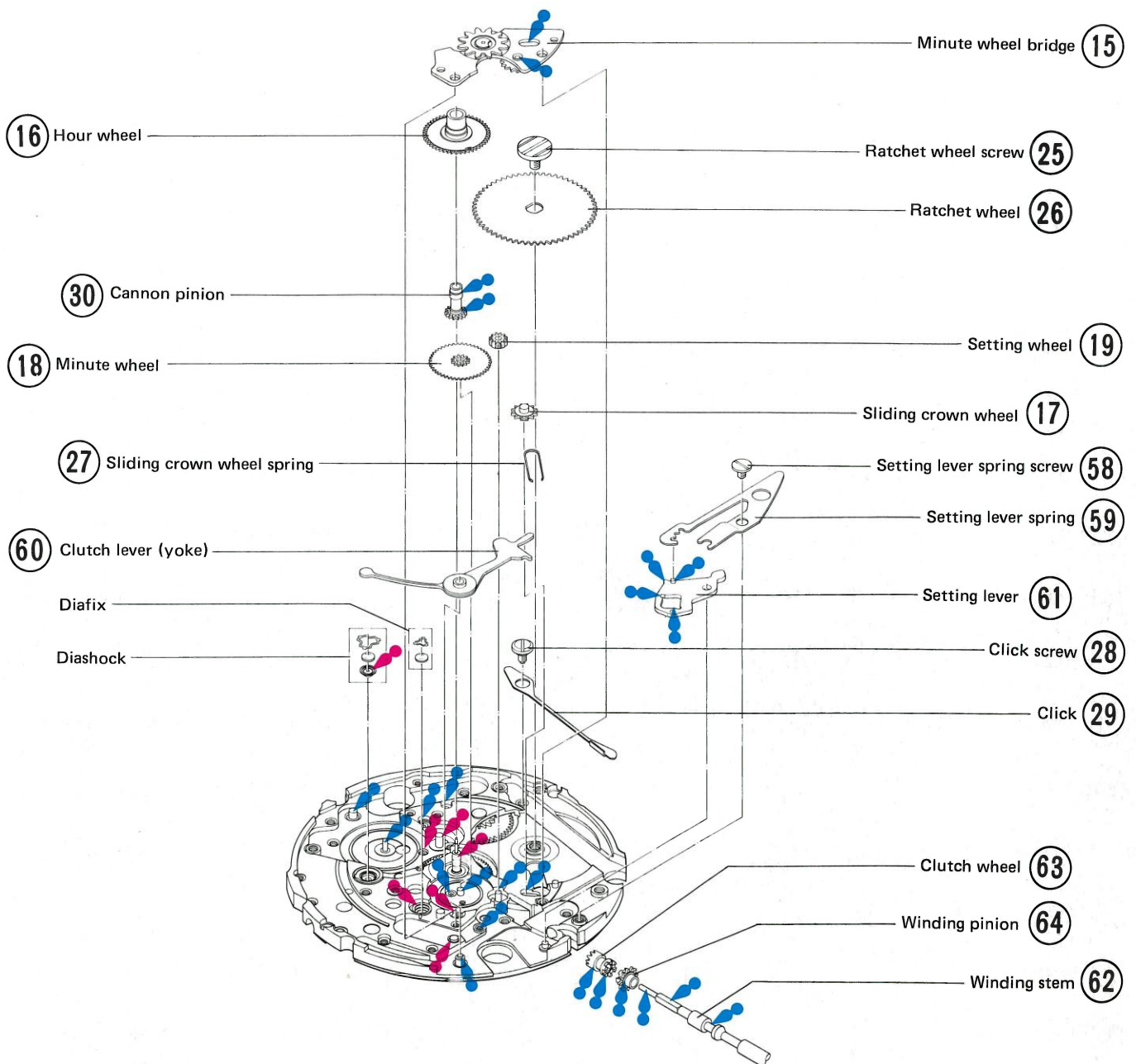


Fig. 7

5206A Setting Mechanism

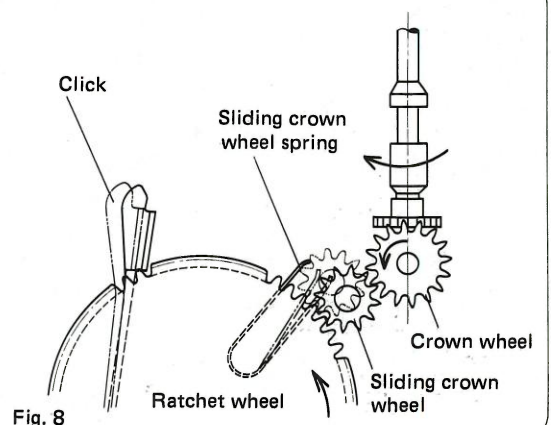


(7) Winding the mainspring (Crown normal position)

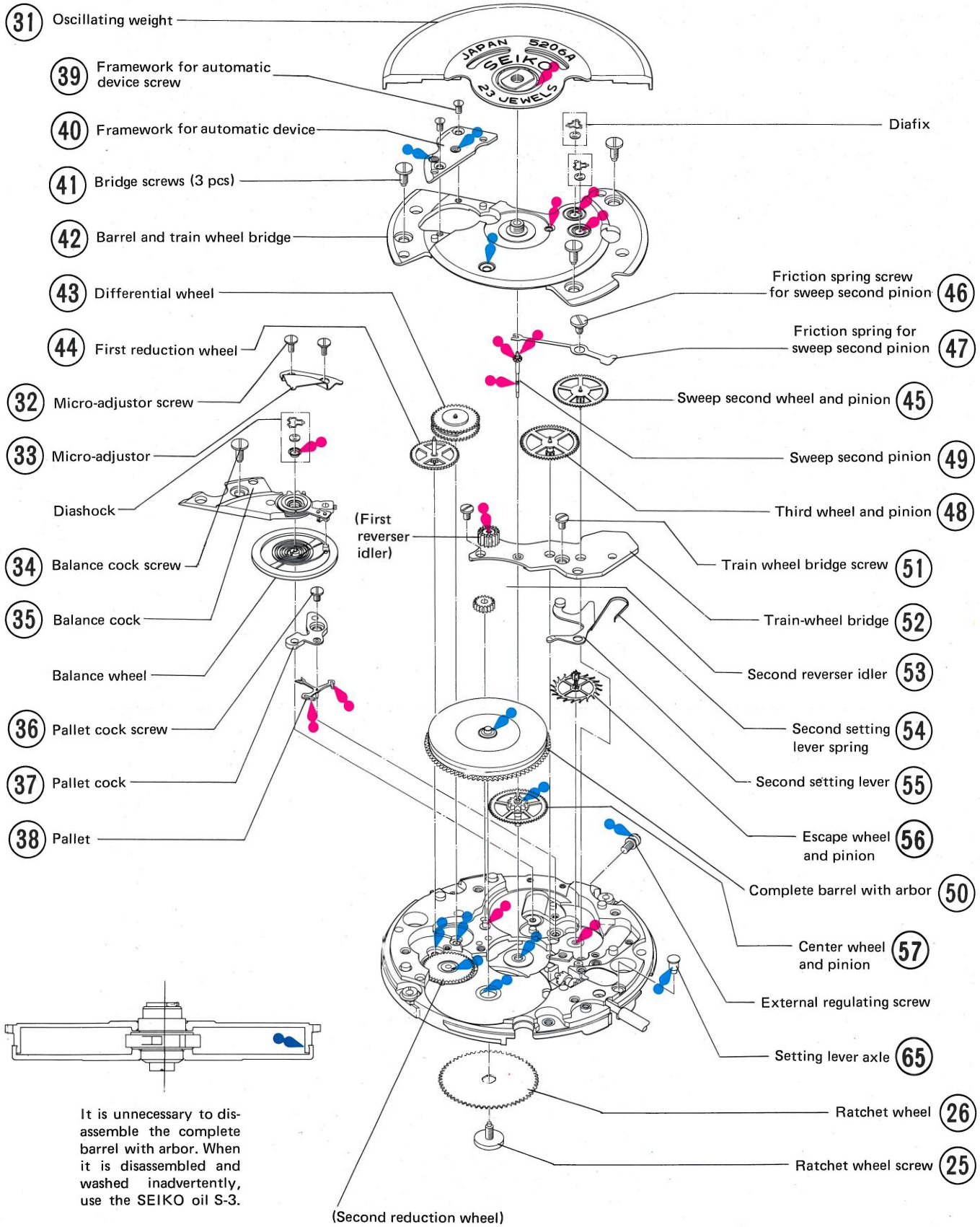
When turning the crown clockwise in a condition that the winding pinion and the crown wheel are meshed (they are assembled on the minute wheel bridge), the ratchet wheel is turned through the sliding crown wheel as shown in Fig. 8. Consequently the mainspring is wound.

When turning the crown counterclockwise, the crown wheel is released from the sliding crown wheel.

In ordinary automatic winding, the crown wheel is also released from the sliding crown wheel.



5206A Automatic Winding Mechanism and Train Wheel



It is unnecessary to disassemble the complete barrel with arbor. When it is disassembled and washed inadvertently, use the SEIKO oil S-3.

5206A Disassembling and Assembling

Sectional Diagram of the Train Wheel

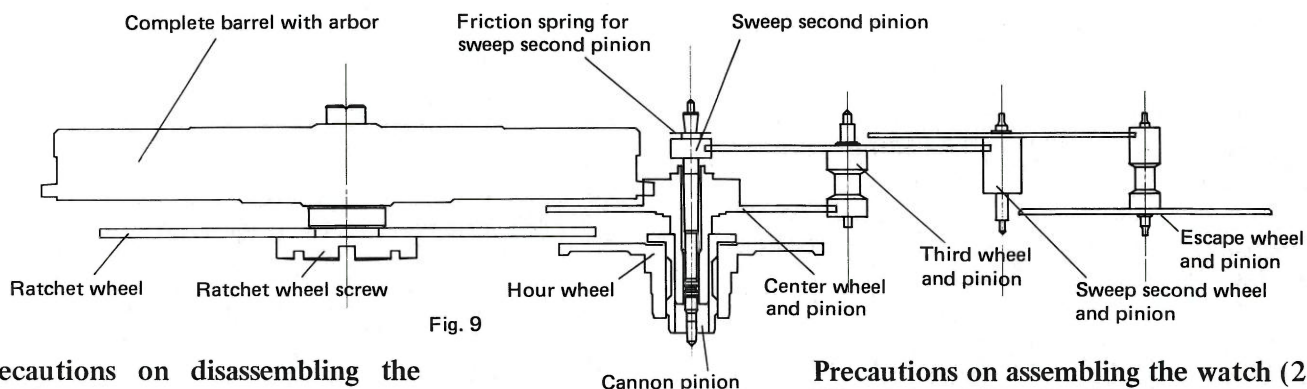
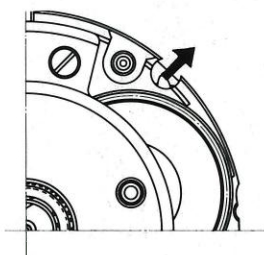


Fig. 9

Precautions on disassembling the watch

1) Releasing the mainspring

For releasing the mainspring, first remove the framework for automatic device; next, remove the differential wheel and the first reduction wheel, then gently move the click in the direction of the arrow with a pair of tweezers pushing the crown to release the mainspring as shown in Fig. 10.



Precautions on assembling the watch (1)

Lubrication

Second reduction wheel

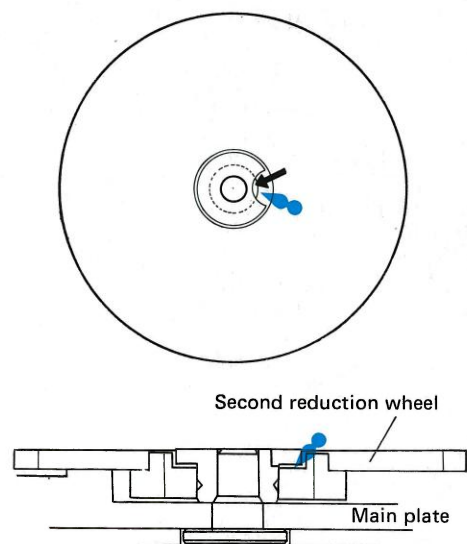


Fig. 11

Precautions on assembling the watch (2)

When assembling the friction spring for sweep second pinion, assemble it from the side as shown in Fig. 12 (assemble it from the arrow direction).

As shown on the right diagram of Fig. 12, if it is assembled from above the sweep second pinion, the friction spring for sweep second pinion will contact the pivot portion, preventing the correct installation.

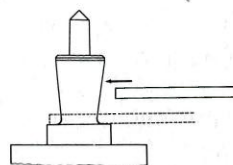
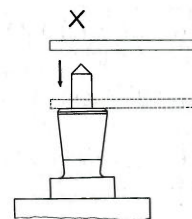


Fig. 12

First reverser idler



Day-date correcting gear

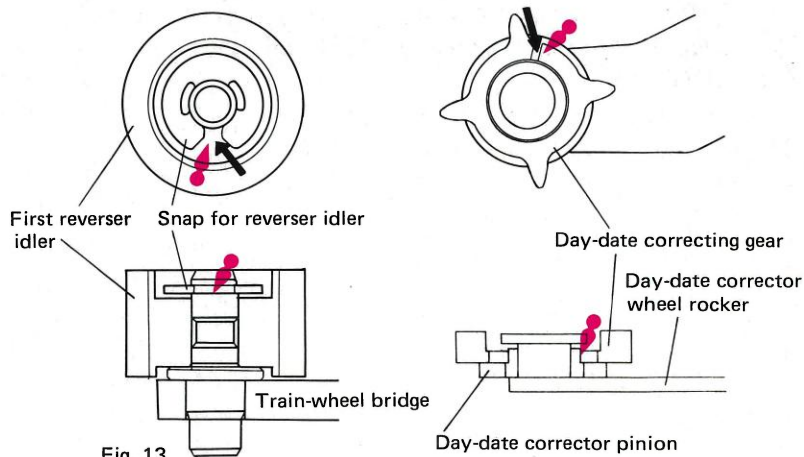


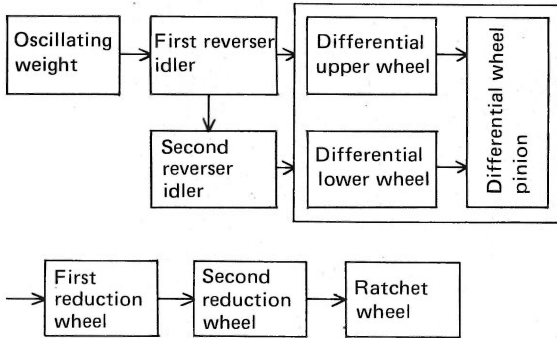
Fig. 13

Lubricate the portions indicated by the arrows as shown in the diagrams. Rotate the gear 3-4 times to spread oil over the shaft surface.

5206A Automatic Winding, Second-setting and Outside Micro-adjusting

(8) Automatic Winding Mechanism

Although the oscillating weight rotates to either the right or left, the rotation is changed into a constant direction by the action of the differential wheel to wind the mainspring constantly. (Fig. 15).



(9) Second Setting Device

When the crown is pulled out to the second click to make hand-setting condition, the pin tip of the second-setting lever holds the balance wheel so that the watch stops. (Fig. 16).

(10) Outside micro-adjusting device

This device permits adjusting the watch gain or loss without opening the case.

When turning the external regulating screw clockwise after removing the tap-screw of outer device on the case, the micro-adjuster is moved to turn the regulator in the direction of (-). If the external regulating screw is turned counterclockwise, the micro-adjuster moves the regulator in the direction of (+). (Fig. 17).

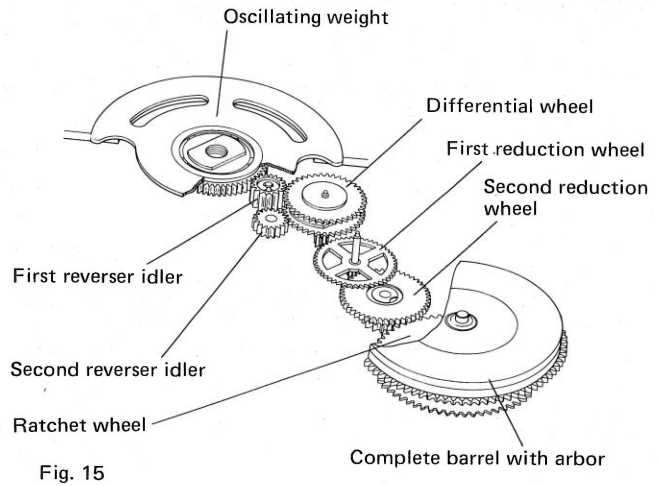


Fig. 15

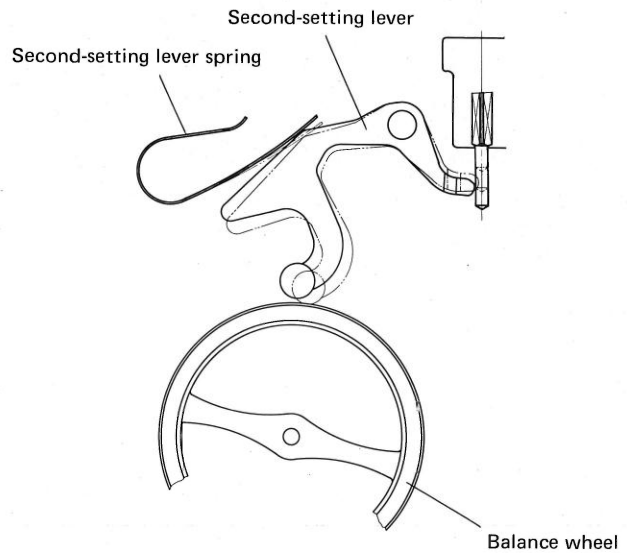


Fig. 16

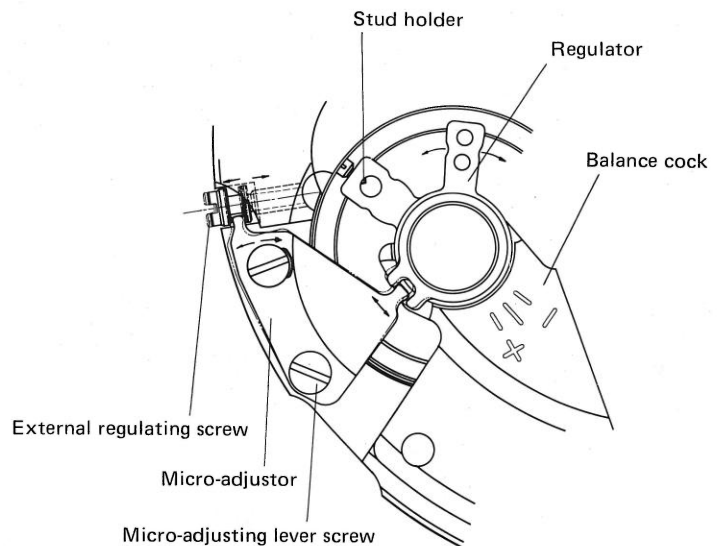


Fig. 17

5606A

1) Specifications

Casing diameter	25.60 mm
Height	4.25 mm
Vibrations per hour	21,600
Automatic winding (with auxiliary hand winding device)	
Calendar (day & date, bilingual change-over mechanism for day indication, instant day & date setting device)	
Second-setting device	

2) Features

Sufficiently maintaining energy of the balance wheel assures excellent accuracy. 5606A maintains high-grade characteristics in all phases.

3) Disassembly and Assembly

Disassemble the watch according to the procedures shown in figures(1)to(71).
Assemble the watch according to the procedures shown in figures(71)to(1).

4) Lubrication

Colored symbols printed in the figures show types of oil and lubrication points.

- ▶ Moebius Synt-A-Lube
- ▶ Seiko watch oil S-4

Points where oil other than the above is used are separately indicated, and should be lubricated correctly according to instructions.

NOTE) Portions with no indications do not require lubrication.

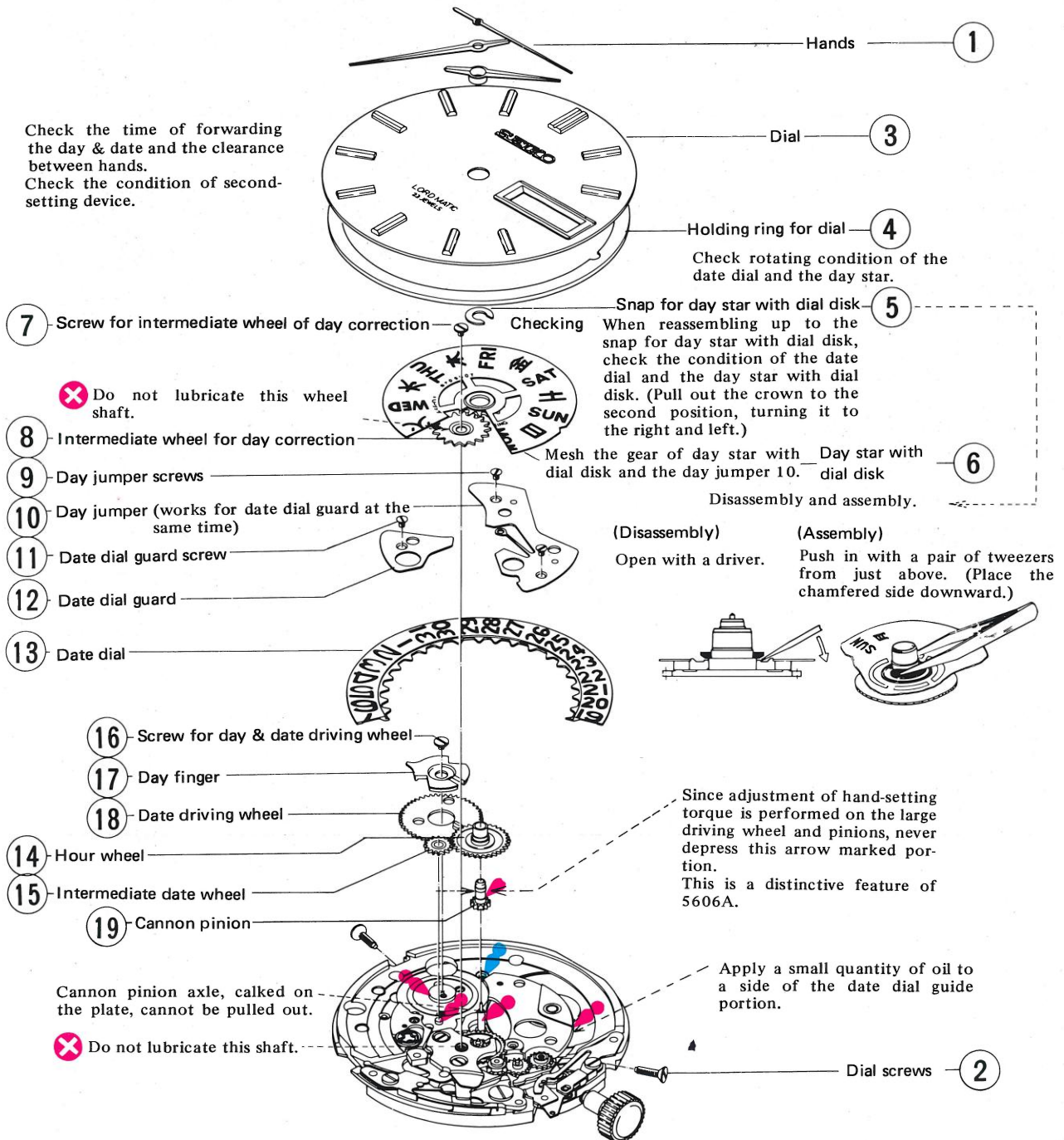
Oil quantity

- ▶ Extremely small quantity
- ▶ Normal quantity
- ▶ Sufficient quantity
- ✕ Oil must not be applied



Enlarged movement

5606A Calendar mechanism



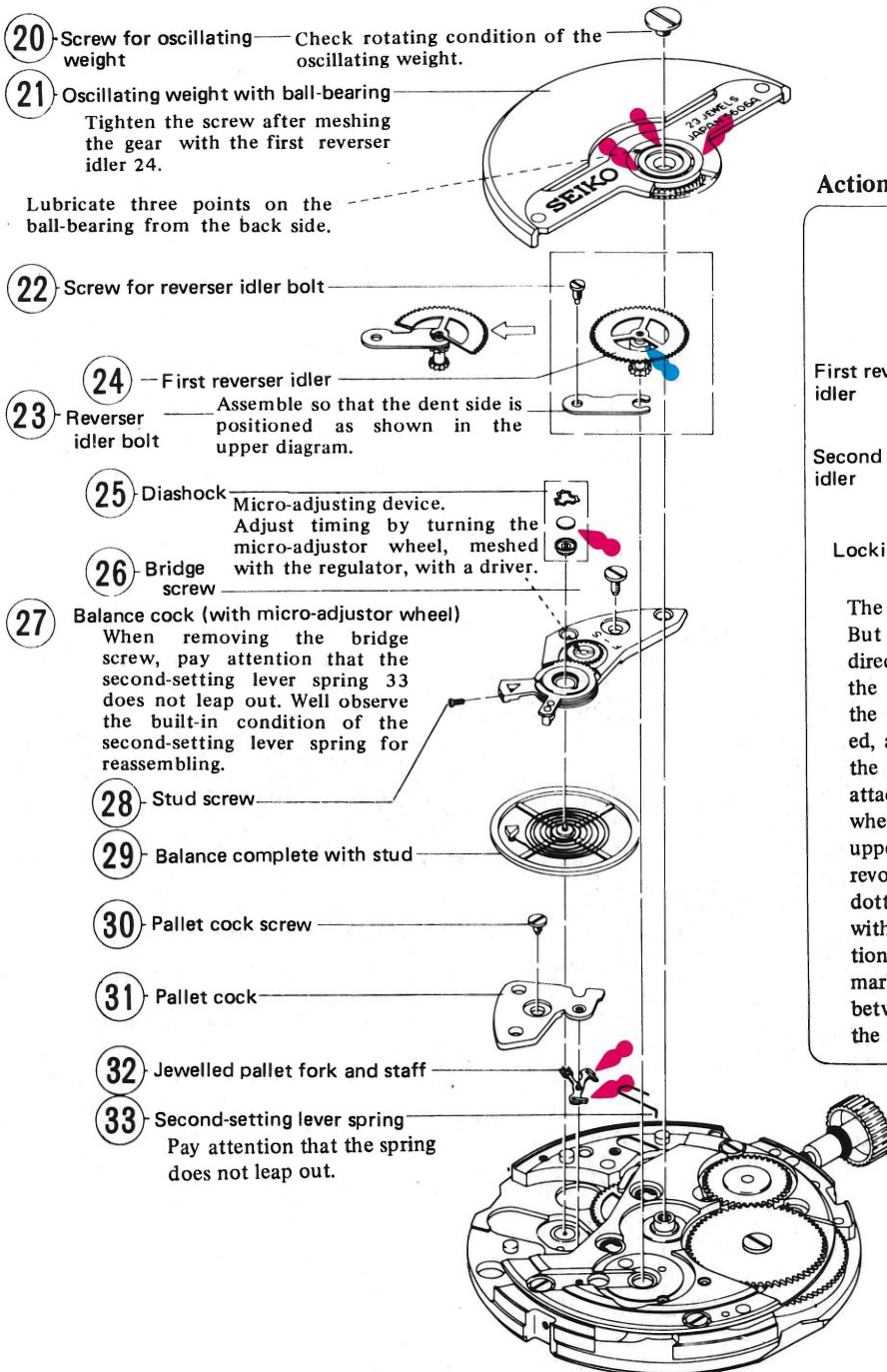
Selecting the language of the day of week:

When setting the day of week, two languages appear alternately in the calendar window. Therefore set one of your choice through Seiko's novel bilingual change-over system, and later on the designated one will appear in the calendar window automatically. (However, when shifting to the next day, the other language appears temporarily.)

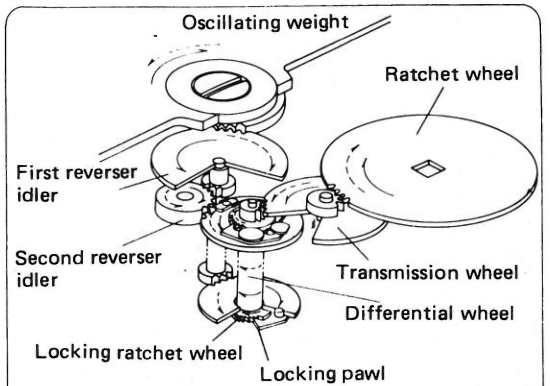
NOTE) 1. When the hands are positioned in the range between 8 P.M.-1 A.M., avoid the date and day correction to protect the gears from damage.

2. Bilingual day of week is provided for all models except those having the day calendar window at 6 o'clock position.

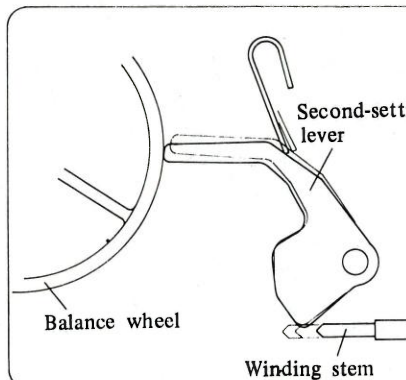
5606A Automatic winding mechanism



Action of automatic winding mechanism



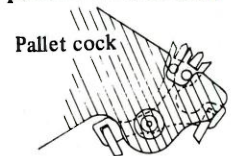
The oscillating weight rotates in either direction. But the ratchet wheel revolves in a constant direction by action of the differential wheel, and the mainspring is always wound. The gear and the pinion of the differential wheel are separated, and only when the locking pawl attached to the gear meshes with the locking ratchet wheel attached to the pinion does the differential wheel rotate with the pinion as one body. The upper gear rotates with the pinion only when revolution is in the direction shown by the dotted arrow mark, and the lower gear rotates with the pinion only—as one body—when revolution is in the direction shown by the solid arrow mark. The transmission wheel is positioned between the barrel and train-wheel bridge and the transmission wheel bridge.



Second-setting

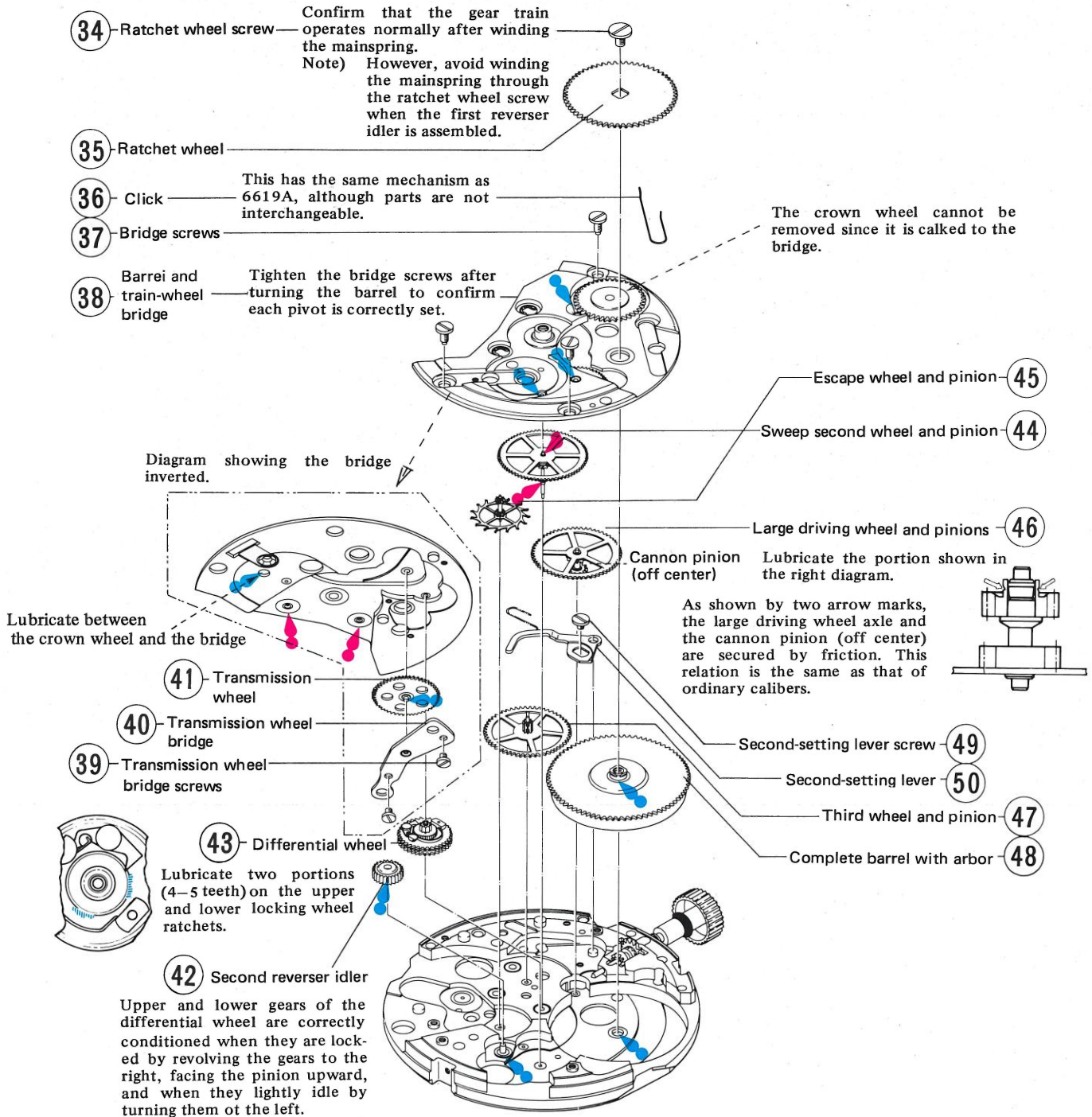
When forming a hand-setting condition by pulling out the crown to the third position, the tail of the second-setting lever departs from the tip of the winding stem and the head portion holds the balance wheel, bringing the watch to a stop. When the crown is pushed in, the second-setting lever is separated from the balance wheel and the watch starts to move. Consequently, the watch is set correctly to the second.

Jewelled pallet fork and staff



A pin which stands on the fork-shaped portion strikes a notched portion of the pallet cock, regulating the action; consequently, no banking pin is used.

5606A Train wheel



Train wheel (process of power transmission)

The large driving wheel and pinion is located off position from the center and is contacted by the minute wheel with the cannon pinion (off center) fitted to the large driving wheel and pinion. Ordinarily, the cannon pinion (off center) rotates with the large driving wheel and pinion; however, it runs idly during hand setting operation by using the crown. A cannon pinion shaft which receives the cannon pinion stands in the center of the plate.

Third wheel and pinion

Sweep second wheel and pinion

Large driving wheel and pinion

Barrel

Escape wheel and pinion

Balance wheel

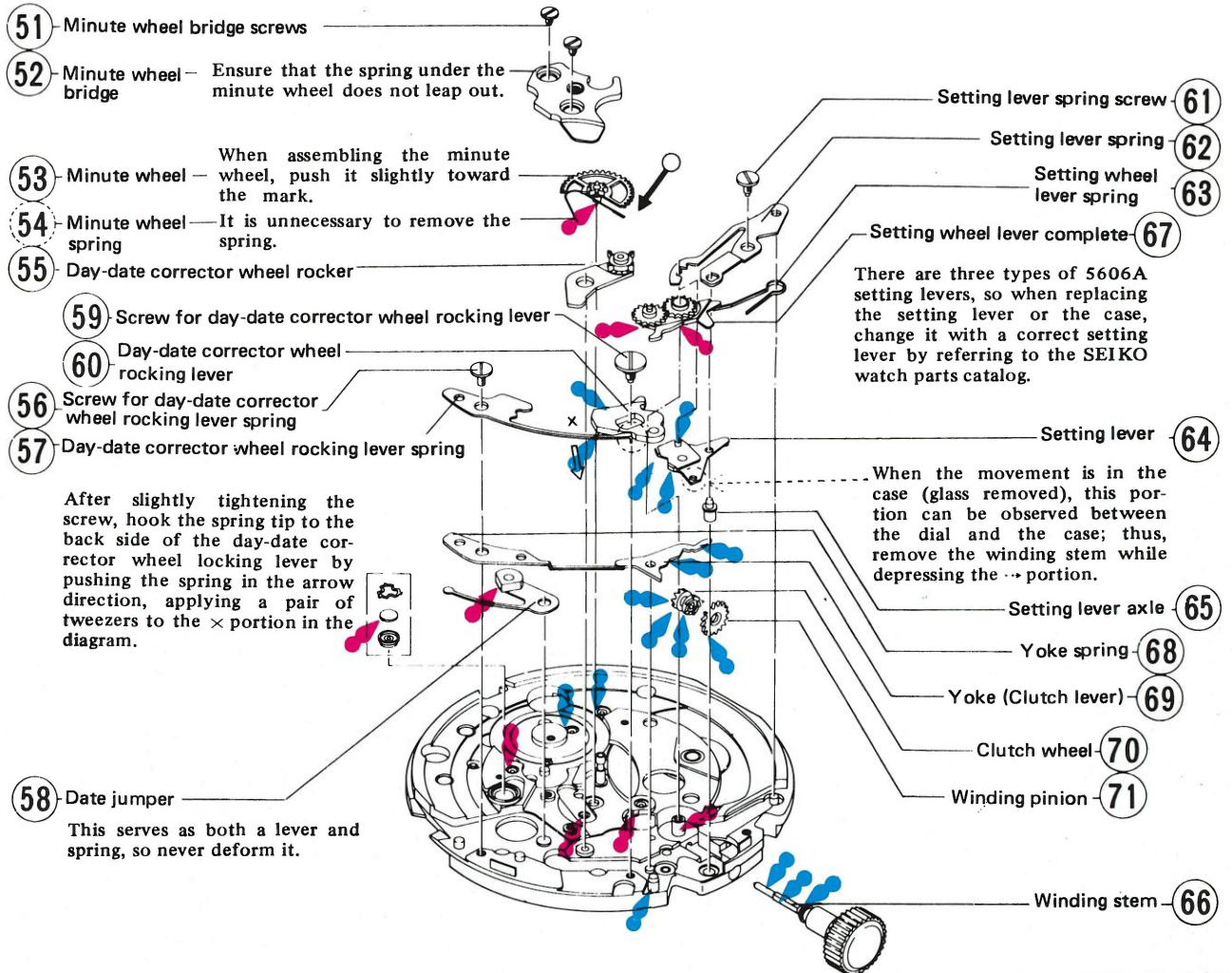
Minute wheel

Cannon pinion (off center)

Cannon pinion

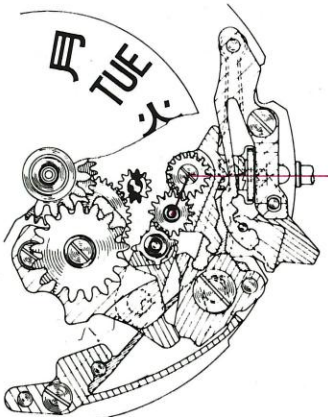
Hour wheel

5606A Setting mechanism



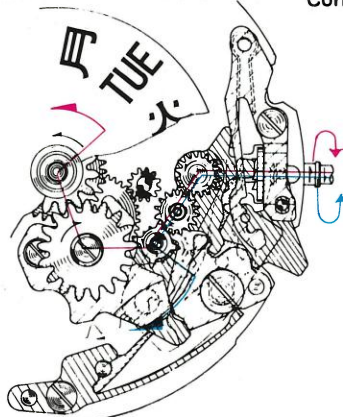
Ordinary position of crown (Mainspring winding)

The winding pinion and the clutch wheel are meshed and the mainspring is wound when the crown is turned in this position.



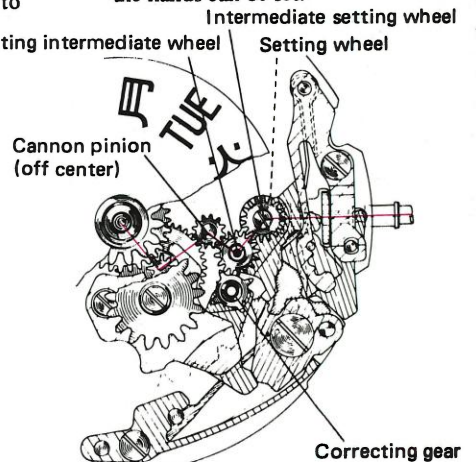
Second position of crown (Setting the day and date)

The clutch wheel and the setting wheel (located under the intermediate setting wheel) are rotated with the intermediate setting wheel. When the crown is turned to the right in this position, the day star with dial disk is shifted. And when turned to the left, the date dial is shifted. (The date correcting gear meshes with the date dial or the intermediate wheel for day correction according to the direction the crown is turned).

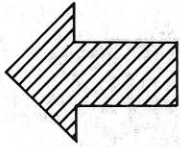


Third position of crown (Setting time)

When the setting wheel lever complete is pushed by the setting lever, the correcting intermediate wheel and the cannon pinion are meshed. When the crown is turned in this position, the hands can be set.



5606A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING



Regarding repairing and adjusting of Cal. 5606A, we already mentioned them in the SEIKO TECHNICAL GUIDE. However, on these pages, items to be checked on watch stopping, and repairing and adjusting for each item, are compactly arranged to facilitate further comprehension.

1. Items to be confirmed before beginning repair work

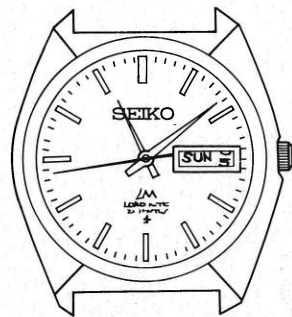
* Checking the number of remaining windings of the mainspring.

2. When only the second hand is in motion, and the hour and minute hands stop, during calender shifting.

3. When the watch (balance) stops completely.

5606A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING

(Example of stopped calendar shifting)



1 Confirm the Following Items Before Beginning Repair Work.

- Check *the number of remaining windings of the mainspring of the watch, in which calendar shifting stops in a condition as shown in the above diagram.
- In this case, when the number of remaining windings of the mainspring is.....
Under 1 winding..... Adopt Procedure 2
More than 1 winding..... Adopt Procedure 3

Confirm the following points for the actually moving watch which is claimed to have stopped during the night.

- Wind the ratchet wheel 1.5 revolutions after complete release of the mainspring.
- Set the hands to 10:30 (p.m.), then leave the watch as it is.
- As shown in the above diagram, if the watch comes to a halt during calendar shifting, confirm the following items, then adopt Procedure 2 or 3.

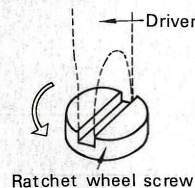
When the hour and minute hands stop and only the second hand is moving..... Adopt Procedure 2
When the balance stops.... Adopt Procedure 3

*Checking the number of remaining windings of the mainspring

- Pull out the crown to the first or second click.
- Remove the automatic winding section (oscillating weight section).
- Firmly hold the ratchet wheel screw with a driver and release the click by using a pair of tweezers.
- In this condition, gradually turn the ratchet wheel screw counterclockwise until the mainspring force is exhausted (releasing the mainspring).
- This revolving number of the ratchet wheel screw corresponds with the number of remaining windings of the mainspring.

(Note)

It is convenient to count the number of remaining windings of the mainspring by confirming the direction of the groove of the ratchet wheel screw.



2 [When the number of remaining windings of the mainspring is under 1 winding.]

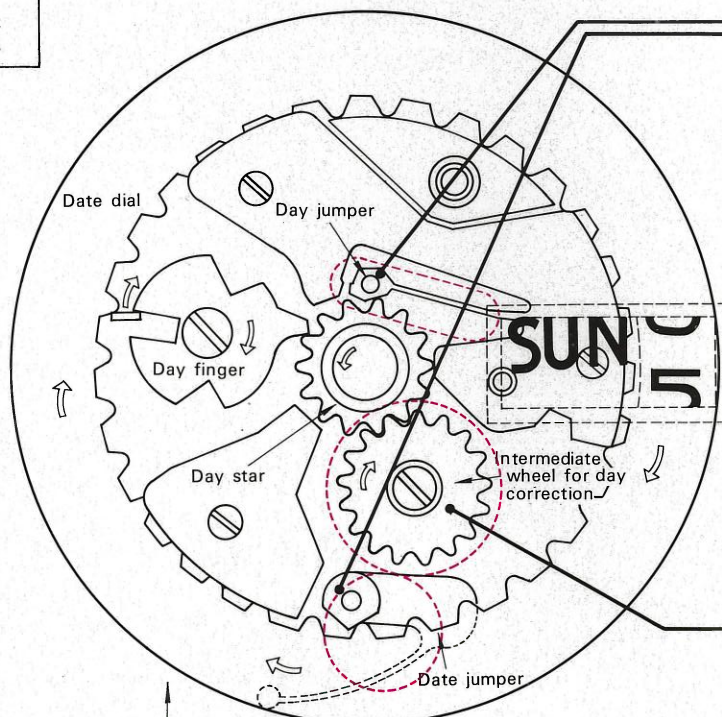
2 When only the Second Hand is in Motion and the Hour Hand and Minute Hand stop During Calendar Shifting.

In this case, inspect the watch according to CHECKING PROCEDURES 4, 5, and 8.

3 [When the number of remaining windings of the mainspring is more than 1 winding.]

3 When the Balance Completely stops

In this case, inspect the watch according to CHECKING PROCEDURES 5 - 8.



This diagram indicates a stopping condition of calendar shifting. (A diagram in which the dial and the day star with dial disk are removed).

Checking procedure	Checking details	Repairing and checking methods
4	(The cause was due to loosened caulking of the cannon pinion (off-center) attached to the large driving wheel and pinion). (Refer to the diagram on the right)	Replace the large driving wheel and pinions with a new one. (Note) Never caulk the cannon pinion. [* When setting the hands, the setting wheel lever meshes with the cannon pinion (off-center).] Complete barrel with arbor
5	(The cause is due to too strong spring characteristic of the day jumper and date jumper, therefore correct them as shown in the diagram on the right).	Hold this portion with a pair of tweezers, and slightly bend it in the arrow direction. Insert the tips of tweezers in this hole and slightly bend it in the arrow direction. (Note) After correcting these jumpers, perform day and date correction gradually and gently, check whether or not they gear correctly with the day star with dial disk or the date dial.
6	Check whether or not oil is adhered to the back side of the day star with dial disk.	When oil is adhered (X)..... 1. Wipe off oil adhered to the back side of the day star with dial disk. (Or wash it quickly with benzine.) Never use trichloroethylene, Fuji-clean, S-clean, etc. 2. Wipe off oil adhered to the surface of the plate, date dial guard, etc. (Note) Apply a small quantity of oil to the lower portion of the barrel arbor, and the lower pivot of the center wheel.
7	Check on revolving condition of the intermediate wheel for day correction.	When the intermediate wheel for day correction does not revolve smoothly (X)..... Wash the parts which are in the diagram on the right. (Use ultrasonic cleaner as far as possible.) (Note) Never lubricate the intermediate wheel for day correction (axle).
8	Always check the escapement portion even when no malfunction is found in Procedures 4 through 7. 1. Are adjusting and lubricating conditions of the escapement portion proper? 2. Are shake, clearance and wobble in wheels, day star and etc. proper? 3. Is there any invasion of chips, dust, shag, and so on into the movement?	1. If there is any malfunction, repair and adjust the escapement. 2. Normalize conditions of the pallet jewels and their oil maintaining condition.

General Checking Procedures After Repairing

Fully wind up the mainspring (the mainspring is fully wound by turning the ratchet wheel more than seven times from its entirely released condition). Set the hands to 3 o'clock (p.m.) and leave the watch as it is. The watch is in excellent condition if it does not stop at the second calendar shifting (33 hours after starting).

5619A SEIKO DUAL-ZONE TIMER

1) Specifications

Casing diameter	25.60 mm
Height	4.25 mm
Vibrations per hour	21,600
Automatic winding (with auxiliary handwinding device)	
Calendar (date) with instant date setting mechanism.	
Second-setting device	
Sub-Hour Hand (with Sub-hour hand setting device)	

2) Features

In addition to the ordinary hour, minute, and second hands of conventional watches, the SEIKO Dual-Zone Timer has a special "Sub-Hour Hand" interlocked with the hour hand. With this Sub-Hour Hand, easily adjustable by manipulating the crown, both the local time and the wearer's own country's standard time can simultaneously be known when traveling abroad. All it requires is previously setting the hand to the particular local standard time. Another unique feature is that the Sub-Hour Hand can be set independently of the ordinary timekeeping operation of the watch. Thus, you can change the Sub-Hour Hand as often as you wish, and still maintain uninterrupted accurate time.

3) Disassembly and Assembly

Calendar and Sub-Hour Hand mechanisms

Disassemble in the order given by Fig. Nos. ① through ⑰.

Assemble in the reversed order.

For disassembling and assembling of other mechanisms, the procedures are the same as in 5606A (see 5606A, Disassembly and Assembly).



4) Lubrication

Colored symbols given with the figures indicate types of oil, lubrication quantity and points.

Types of oil

- ▶ Moebius Synt-A-Lube
- ▶ SEIKO watch oil S-6

Oil quantity

- Extremely small quantity
- Normal quantity
- Sufficient quantity
- ✕ Oil must not be applied.

Handling Instructions



Setting the sub-hour hand

To set the Sub-Hour Hand

Sub-Hour Hand adjustment is made at the first click position of the crown by turning it clockwise. Since the Sub-Hour Hand moves at one-hour intervals, rotate it by the time difference between the two places you want to refer to.



Setting the calendar

To set the Calendar

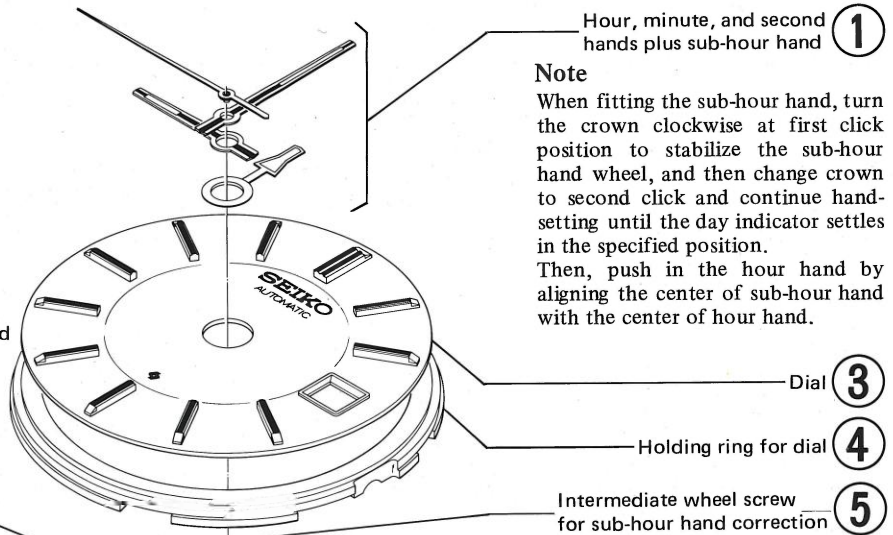
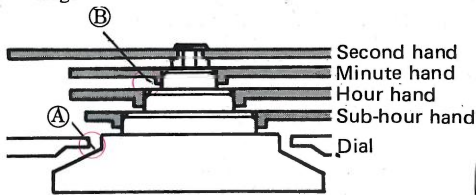
Pull the crown out to the first click and turn it counterclockwise.

Note: You cannot make calendar changes manually between 9:00 p.m. and 1:00 a.m.

5619A Calendar and Sub-Hour Hand Mechanisms

Caution when Assembling

- After mounting the dial, check clearance between dial and hour wheel. (Section A)
- After fitting the hands, check clearance between the minute hand tube and hour wheel. (Section B)
- Check movement of the date indicator, as well as the clearance between hands.
- Check the condition of second-setting.



Note

When fitting the sub-hour hand, turn the crown clockwise at first click position to stabilize the sub-hour hand wheel, and then change crown to second click and continue hand-setting until the day indicator settles in the specified position. Then, push in the hour hand by aligning the center of sub-hour hand with the center of hour hand.

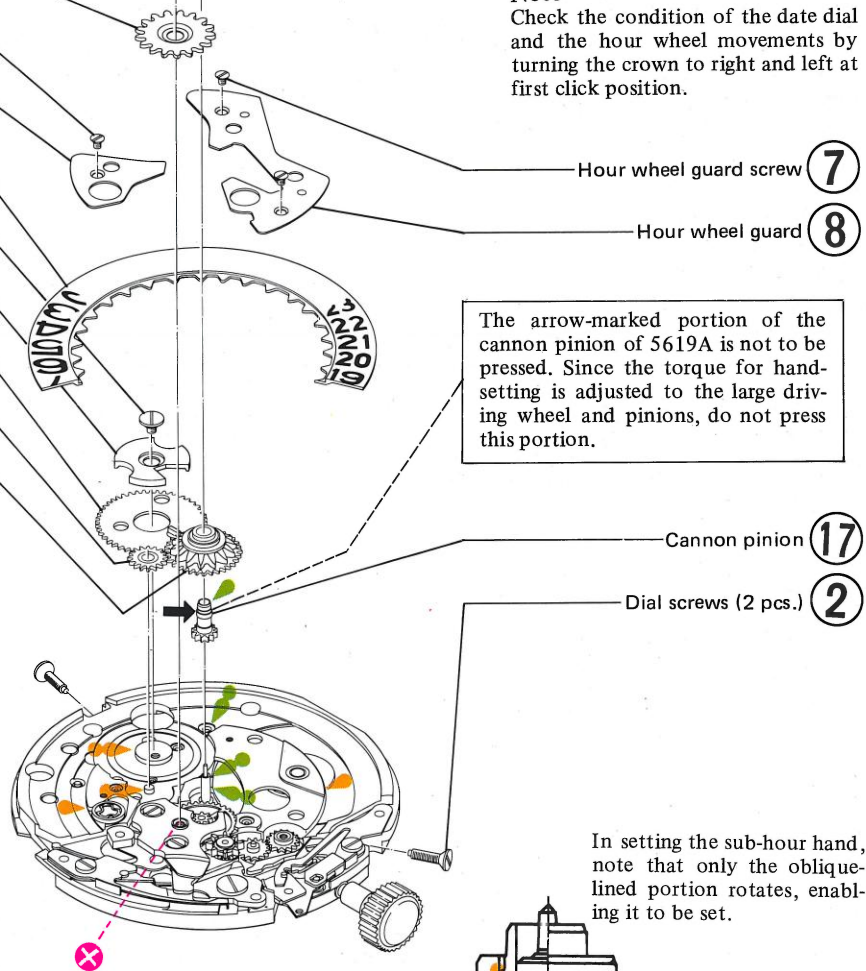
Note

Check the condition of the date dial and the hour wheel movements by turning the crown to right and left at first click position.

- 6 Intermediate wheel for sub-hour hand correction
- 9 Date dial guard screw
- 10 Date dial guard
- 11 Date dial
- 13 Date driving wheel screw
- 14 Date driving wheel holder
- 15 Date driving wheel
- 12 Intermediate date wheel
- 16 Hour wheel (with sub-hour hand wheel)

- 7 Hour wheel guard screw
- 8 Hour wheel guard

The arrow-marked portion of the cannon pinion of 5619A is not to be pressed. Since the torque for hand-setting is adjusted to the large driving wheel and pinions, do not press this portion.

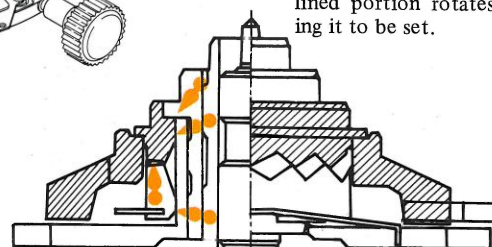


Note

The hour wheel cannot be disassembled. Clear the hour wheel only when the sub-hour hand cannot be corrected or smoothly adjusted. Normally when assembling or disassembling, cleaning the hour wheel is unnecessary.

After cleaning the hour wheel, dip it completely in a solution of benzine and Moebius Synt-A-Lube (approx. 50 to 1), and let it dry at room temperature before assembling.

In setting the sub-hour hand, note that only the oblique-lined portion rotates, enabling it to be set.



Lubrication points of hour wheel

6106A (Seiko Five Deluxe)

1. Specifications

Casing diameter 27.00 mm

Height 5.15 mm

Vibrations per hour 21,600

Automatic winding with sweep second

Calendar (day and date)

Second setting device

2. Automatic winding mechanism

2.-1 Exploded view of automatic winding mechanism (Fig. 1)

2.-2 Transmission of force in automatic winding mechanism (Fig. 2)

- An eccentric pin on a ball bearing performs circular motions by right and left rotations of the oscillating weight.
- The pawl lever performs reciprocative motions due to circular movement of the eccentric pin, and the pawl lever rotates the transmission wheel constantly in one direction.
- This motion is transmitted to the ratchet wheel from the transmission wheel; thus, the mainspring is wound.
- Since a pawl lever is adopted, whose actions transmit right and left rotations of the oscillating weight in one direction—magnifying the rotating force—and prevent reversal motion of the mainspring, this automatic winding mechanism is extremely simplified.
- In addition to the simplified construction, all automatic winding parts are set on the framework for automatic device; as a result, disassembling and reassembling are extremely easy.

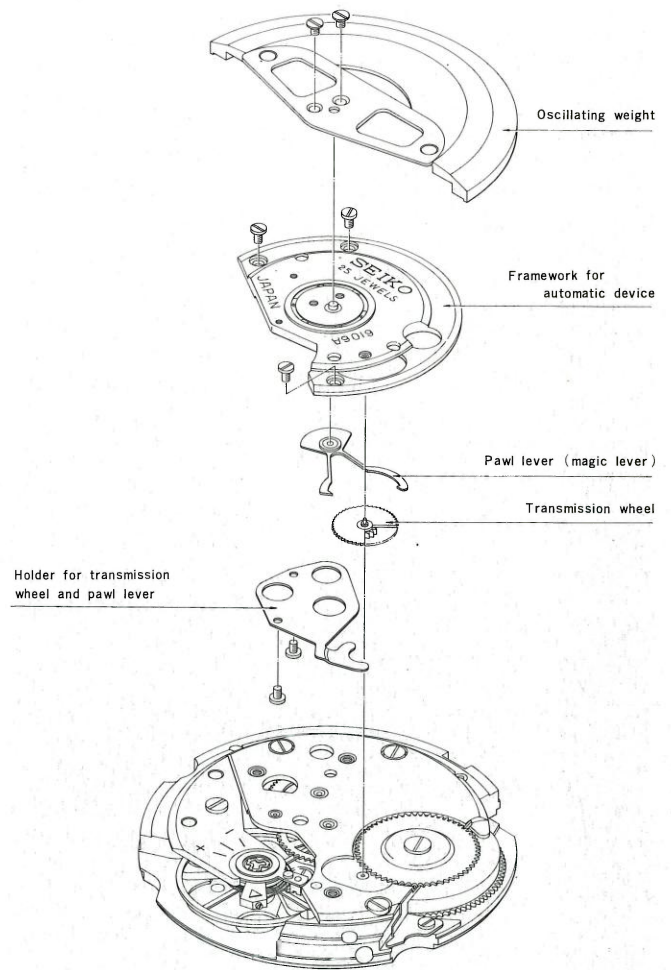
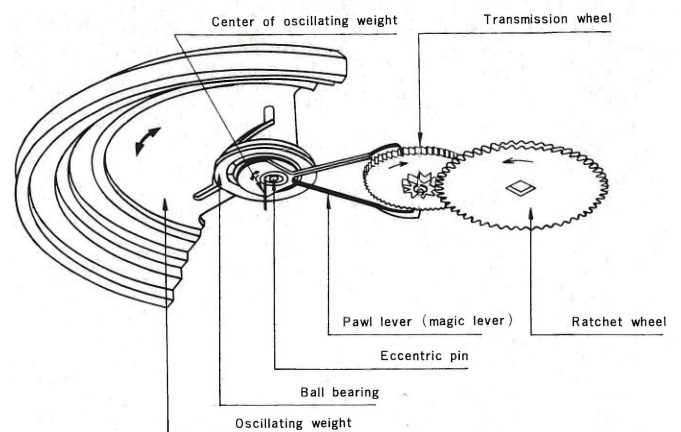


Fig. 1



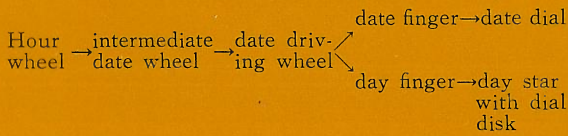
Note: Since the ball bearing is attached firmly on the framework for automatic device, it cannot be removed.

Fig. 2

3. Calendar mechanism

3.-1 Exploded view of calendar mechanism (Fig. 3)

3.-2 Transmission of force in the calendar device



(Fig. 3)

3.-3 Day setting

Day correction is performed by moving the hour hand between 10 p.m. and 1 a.m. repeatedly until the correct day appears.

3.-4 Date setting

When the crown is pushed repeatedly in an ordinary position, the date is quickly forwarded by interlocking action of the stem, setting lever, date corrector, date corrector finger, and date corrector spring. (Fig. 4)

3.-5 Snap for day star with dial disk

The position of day star with dial disk in the upper and lower directions is obtained by the snap for day star with dial disk. (Fig. 3)

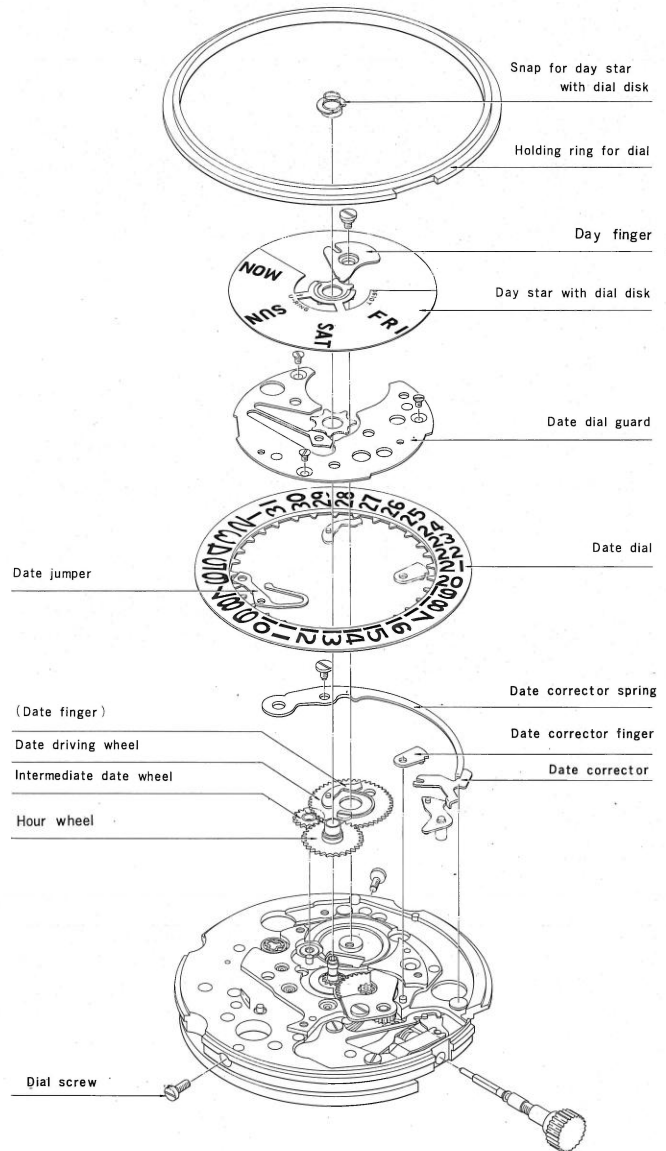


Fig. 3

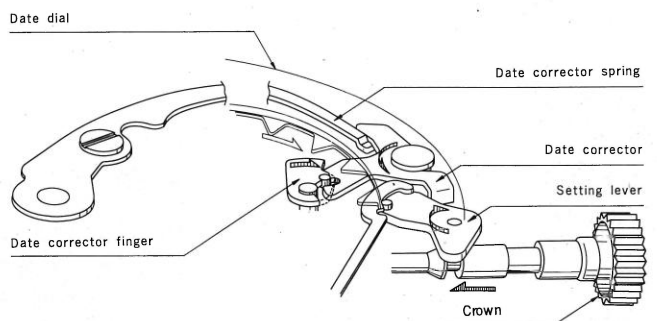


Fig. 4

4. Movement

4.-1 Exploded view of movement

(Figs. 5 & 6)

4.-2 Second setting device

When the crown is pulled out to the second position, the sweepsecond hand stops because the second setting lever locks the balance wheel. (Fig. 7)

5. Disassembly, reassembly and checking

Refer to the following pages.

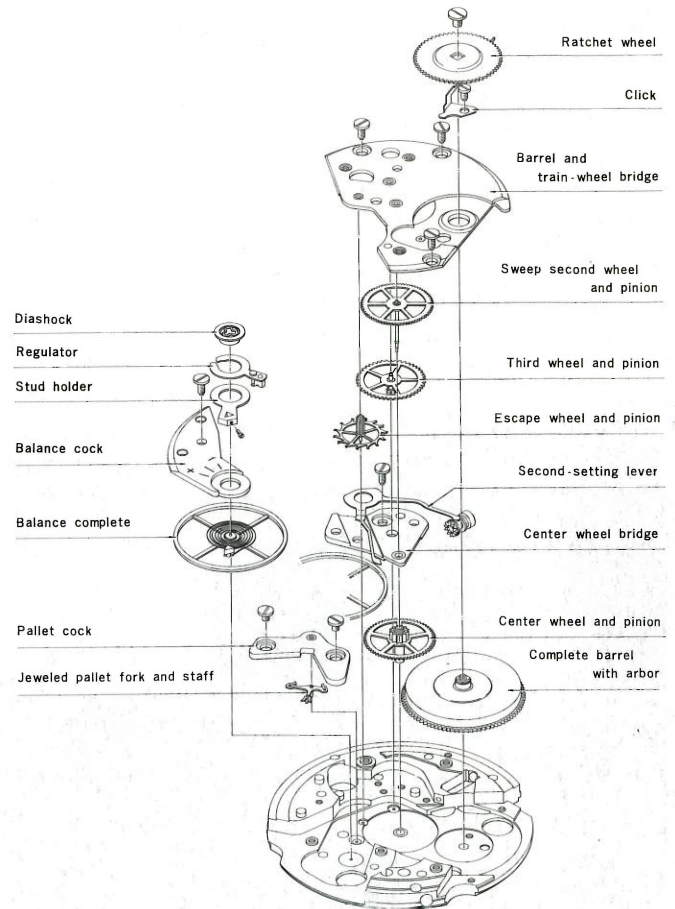


Fig. 5

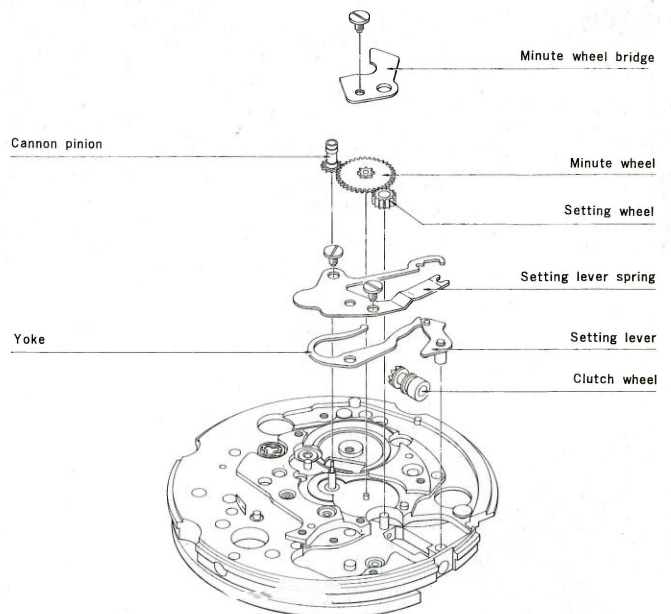


Fig. 6

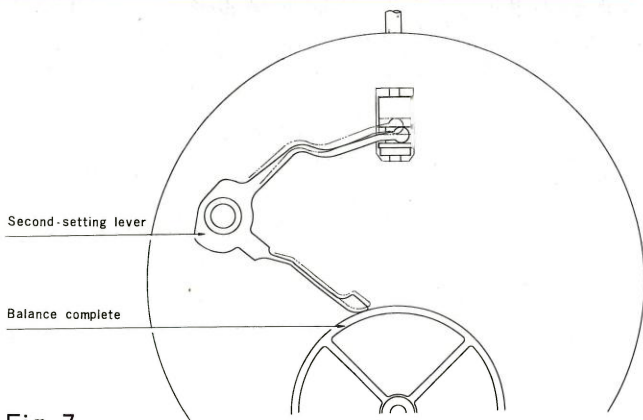
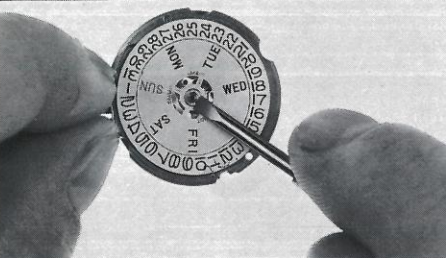
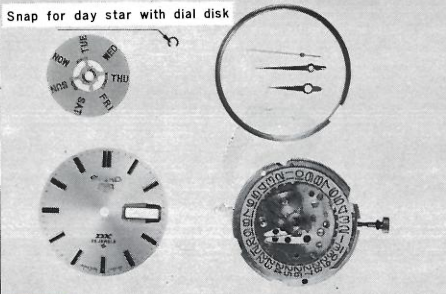
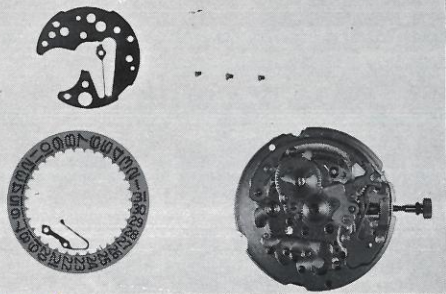
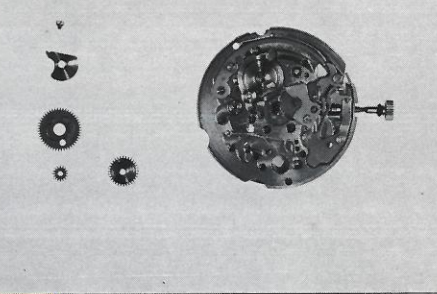
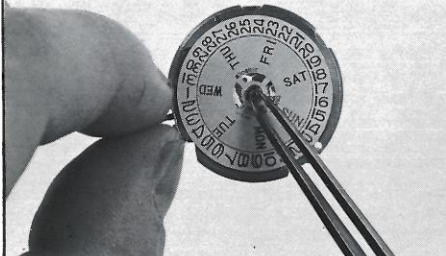
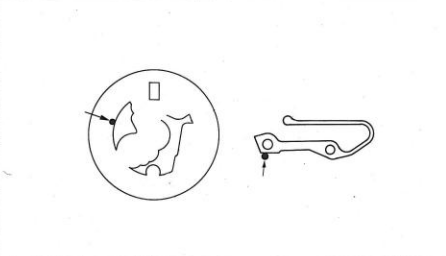
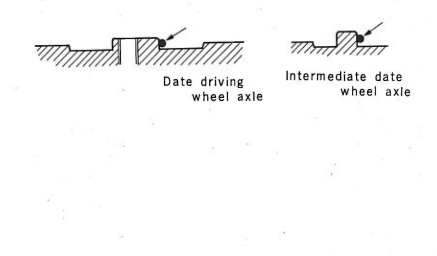


Fig. 7

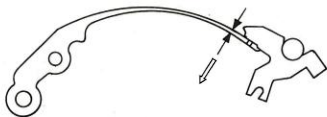
6106A Disassembly and assembly—continued

	1 DIAL	2 DATE DIAL	3 DATE DRIVING WHEEL
Disassembly	<p>Method</p> <ol style="list-style-type: none"> 1) Remove sweep second, minute, and hour hands 2) Remove dial after loosening dial screw 3) Remove holding ring for dial 4) Remove snap for day star with dial disk (refer to photo in remarks). (Use small driver, then gradually pry open entire circumference to prevent deforming dial.) 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove date dial guard screws (3 pcs.) 2) Remove date dial guard 3) Remove date dial 4) Remove date jumper 	<p>Method</p> <ol style="list-style-type: none"> 1) Remove hour wheel 2) Remove intermediate date wheel 3) Remove date driving wheel screw 4) Remove day finger 5) Remove date driving wheel
Remark		<p>When removing date dial guard, sometimes date corrector finger will be dislodged with date dial guard.</p>	
Photo	<p>Snap for day star with dial disk</p> 		
Assembly	<p>Method</p> <ol style="list-style-type: none"> 1) Set day star with dial disk, then assemble snap for day star with dial disk after interlocking it with day jumper (refer to photo in remarks) 2) Set holding ring for dial 3) Set dial and fasten dial screw 4) Set hour, minute, and sweep second hands 5) Check forwarding condition of day star with dial disk 	<p>Method</p> <ol style="list-style-type: none"> 1) Lubricate plate, date dial set position 2) Set date dial 3) Lubricate date jumper (refer to the lower drawing) 4) Set date jumper 5) Set date dial guard and fasten screws (3 pcs.) 6) Check condition of date corrector and date driving 	<p>Method</p> <ol style="list-style-type: none"> 1) Lubricate axles of intermediate date wheel and date driving wheel (Moebius Synt-A-Lube) 2) Set day driving finger on date driving wheel and fasten date driving wheel screw (stepped screw) 3) Set intermediate date wheel and hour wheel
Remark			 <p style="font-size: small; text-align: center;">Date driving wheel axle Intermediate date wheel axle</p>

6106A Disassembly and assembly—continued

	4	5	6
Disassembly	DATE CORRECTOR	FRAMEWORK FOR AUTOMATIC DEVICE	PAWL LEVER
	Method	Method	Method
Remark	Remark	Remark	Remark
Photo	Photo	Photo	Photo
Assembly	10	9	8
Method	Method	Method	Method
Remark	Remark	Remark	Remark

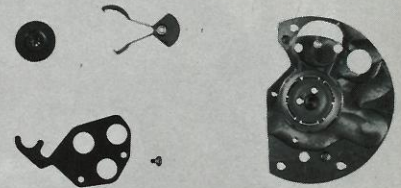
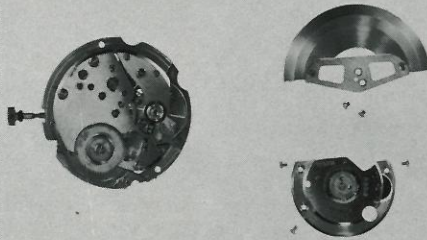
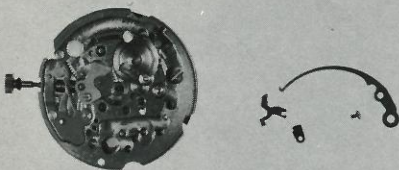
- 1) Remove date corrector spring screw, then hold date corrector spring with tweezers and remove spring in direction of arrow (refer to lower drawing)
- 2) Remove date corrector finger
- 3) Remove date corrector



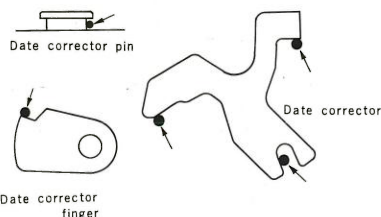
- 1) Check winding condition of mainspring by revolving oscillating weight
- 2) Remove oscillating weight screws (2 pcs.)
- 3) Remove oscillating weight.
- 4) Remove screws (3 pcs.) then remove framework for automatic device

Checking) When making one slow revolution of oscillating weight while observing meshing of pawl lever and transmission wheel through an eye glass confirm whether or not slip in meshing exceeds four teeth. When slip is under four teeth, check shapes of eccentric pin and pawl lever.

- 1) Remove holder screws (2 pcs.) for transmission wheel and pawl lever
- 2) Remove holder
- 3) Remove pawl lever and transmission wheel



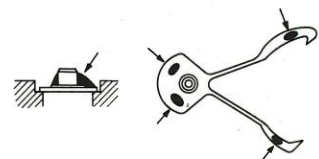
- 1) Lubricate date corrector and date corrector pin (Moebius grease "Remontoires" or watch oil S-4)
- 2) Set date corrector
- 3) Set date corrector spring and fasten screw
- 4) Hold tip of date corrector spring with tweezers, then insert it under date corrector
- 5) Set date corrector finger
- 6) Lubricate date corrector finger (Moebius Synt-A-Lube)



- 1) Set framework for automatic device and screws
- 2) Lubricate teeth and upper pivot of transmission wheel (watch oil S-4)
- 3) Set oscillating weight and its screws (2 pcs.)
- 4) Check operating condition of automatic winding section. (Confirm that oscillating weight is not scraping framework; then confirm revolution of oscillating weight tilting movement in a fully-wound condition)

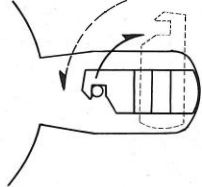
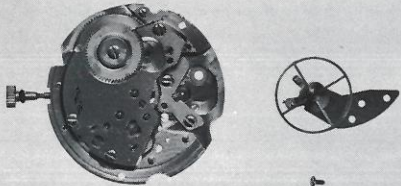

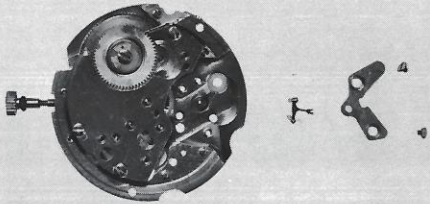


- 1) Lubricate ball-bearing (Moebius Synt-A-Lube at above three points)
- 2) Lubricate eccentric pin (watch oil S-4)
- 3) Set transmission wheel
- 4) Set pawl lever
- 5) Lubricate lower pivot of transmission wheel and pawl lever (watch oil S-4, Moebius grease "Remontoires")
- 6) Set holder for transmission wheel and pawl lever and fasten screws (2 pcs.)
- 7) Check to ensure pawl of pawl lever has not come off transmission wheel

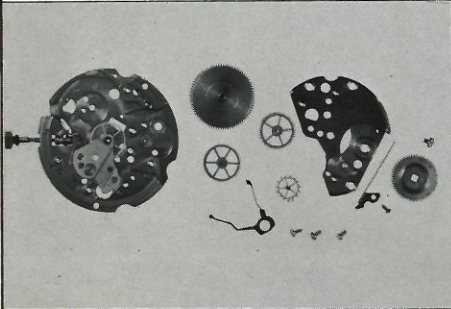
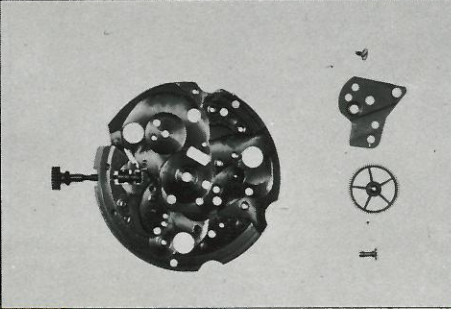
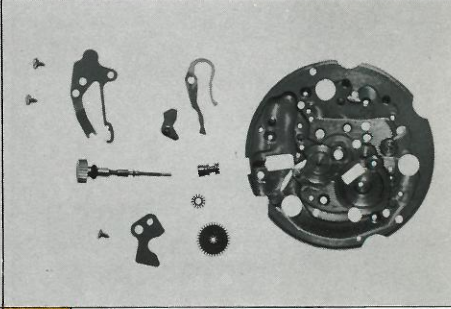
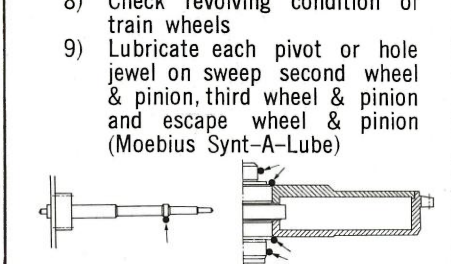
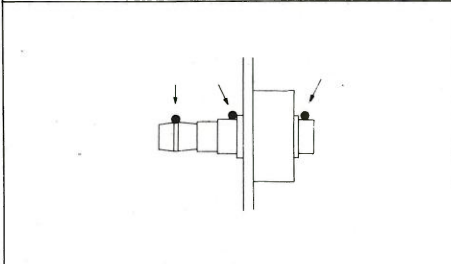
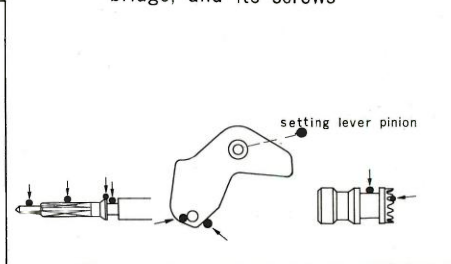


Perform correct lubrication of eccentric pin

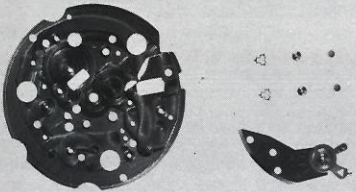
6106A Disassembly and assembly—continued

	7	8	9
Disassembly	BALANCE COCK	BALANCE COMPLETE	PALLET
Method	<ol style="list-style-type: none"> 1) Remove balance cock screw 2) Remove balance cock 	<ol style="list-style-type: none"> 1) Turn regulator key in direction of arrow. (If regulator key is revolved in opposite direction, stud will become bent due to special shape of regulator key) 2) Loosen stud screw 3) Remove balance complete from cock 	<ol style="list-style-type: none"> 1) Loosen mainspring 2) Remove pallet cock 3) Remove pallet
Remark			
Photo			
Assembly	7	6	5
Method	<ol style="list-style-type: none"> 1) Set balance cock and fasten screw 2) Check condition of hairspring (for horizontality, unbalance) 3) Check second-setting condition 	<ol style="list-style-type: none"> 1) Set balance on balance cock, placing stud at hole of stud holder 2) Insert hairspring between regulator key and regulator pin, then turn regulator key in direction of arrow until it comes to correct position (Refer to drawing in disassembling remarks) (If turned excessively, balance will strike stud and may damage it) 	<ol style="list-style-type: none"> 1) Set pallet after lubricating pallet jewels (Moebius Synt-A-Lube) 2) Check pallet operating condition plus meshing of the jewel and escape wheel (A check of jewel meshing should be performed after slightly winding mainspring)
Remark	Do not perform assembly of balance complete at second position (during second-setting) of winding stem pull out; always perform it at first position	Do not widen space between regulator pin and regulator key. Do not deform hairspring.	

6106A Disassembly and assembly—continued

	10	11	12
Disassembly	TRAIN WHEELS	CENTER WHEEL AND PINION	SHIFTING MECHANISM
Method	<ol style="list-style-type: none"> 1) Remove ratchet wheel 2) Remove click 3) Remove barrel & train wheel bridge 4) Remove sweep second & pinion, third wheel & pinion, escape wheel & pinion and barrel 5) Remove second-setting lever 	<ol style="list-style-type: none"> 1) Remove cannon pinion 2) Remove center wheel bridge 3) Remove center wheel and pinion 	<ol style="list-style-type: none"> 1) Remove minute wheel bridge 2) Remove minute wheel 3) Remove setting wheel 4) Remove setting lever spring 5) Remove yoke (clutch lever) 6) Remove setting lever 7) Remove winding stem, then remove clutch wheel
Remark			
Photo			
Assembly	4	3	2
Method	<ol style="list-style-type: none"> 1) Set second setting lever (this time, crown should be set at first position) 2) Set barrel after lubricating barrel arbor (Moebius grease "Remontoires" or watch oil S-4) 3) Set third wheel & pinion, escape wheel & pinion 4) Set sweep second wheel & pinion after lubricating it (Moebius Synt-A-Lube) 5) Set barrel & train wheel bridge and its screws 6) Set click and its screw 7) Set ratchet wheel and its screw 8) Check revolving condition of train wheels 9) Lubricate each pivot or hole jewel on sweep second wheel & pinion, third wheel & pinion and escape wheel & pinion (Moebius Synt-A-Lube) 	<ol style="list-style-type: none"> 1) Set center wheel & pinion after lubricating it (Moebius grease "Remontoires" or watch oil S-4) 2) Set center wheel bridge and its screw 3) Set cannon pinion 	<ol style="list-style-type: none"> 1) Lubricate clutch wheel and winding stem, then set them on plate (Moebius grease "Remontoires" or watch oil S-4) 2) Set setting lever after lubricating (Moebius grease "Remontoires" or watch oil S-4) 3) Set yoke (clutch lever) 4) Set setting lever spring and its screw 5) Lubricate minute wheel pin, setting wheel axle, (Moebius Synt-A-Lube) 6) Set setting wheel 7) Set minute wheel, minute wheel bridge, and its screws
Remark			

6106A Disassembly and assembly—continued

Disassembly	13	DIASHOCK	14	CLEANING	
		<ol style="list-style-type: none"> 1) Remove Diashock spring, cap jewel, and hole jewel with frame 2) Clean these parts 		<p>Clean all parts so far disassembled For further details refer to "Cleaning of parts"</p>	
		Concerning disassembling procedures, refer to common items on Diashock			
Photo					
Assembly	1	DIASHOCK			
		<ol style="list-style-type: none"> 1) Set Diashock hole jewel frame, cap jewel, and spring on plate and balance cock 2) Lubricate these parts 			
Remark	Concerning lubricating method and assembling method of plate for Diashock, refer to common items on Diashock				

6138A Automatic Chronograph

1) Specifications

Casing diameter	27.00mm
Height	7.90mm
Vibrations per hour	21,600
Automatic winding (with auxiliary hand winding)	

Calendar (Day & date, Bilingual change-over mechanism for day indication, Rotary type instant day & date setting device)

Chronograph (Second, hour hand – 12 hour totalizer; minute hand – 30 minute totalizer, accumulated)

2) Features

- An-advanced automatic winding chronograph
- Easy-to-use, regular chronograph mechanism
- SEIKO's special clutch mechanism without starting/stopping errors
- Simplified structure and automatic winding by the stabilized pawl lever system
- Day and date instant setting device operated simply by revolving the crown
- Bilingual change-over mechanism for day indication selectable by preference
- Auxiliary hand winding device instantly usable for measuring time
- External devices with many functions

3) Disassembly and assembly

Disassemble the watch according to Figs.

① → ⑨①

Assemble by reversing the above: Figs.

⑨① → ①

Installation of the automatic winding mechanism varies as compared with conventional watches.

The automatic winding mechanism should be installed after setting the movement with hands in the case for adjusting chronograph mechanism and setting hands works.

4) Lubrication

Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and lubricating points.

Types of oil:

- ▶ Moebius Synt-A-Lube
- ▶ Seiko watch oil S-4

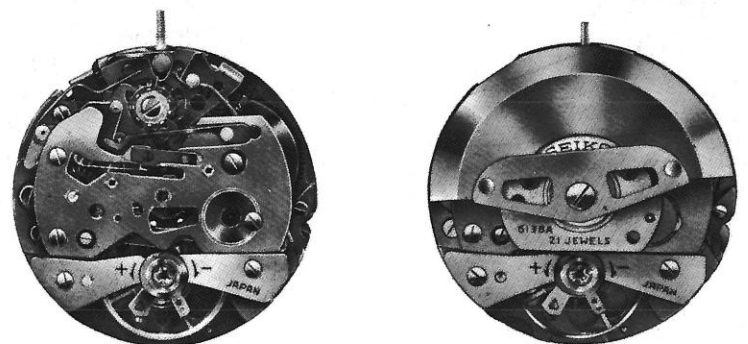
Oil quantity

- ▶ Extremely small quantity
- ▶ Normal quantity
- ▶ Sufficient quantity
- ⊗ Oil must not be applied.

Note: Unindicated portions do not require lubrication.

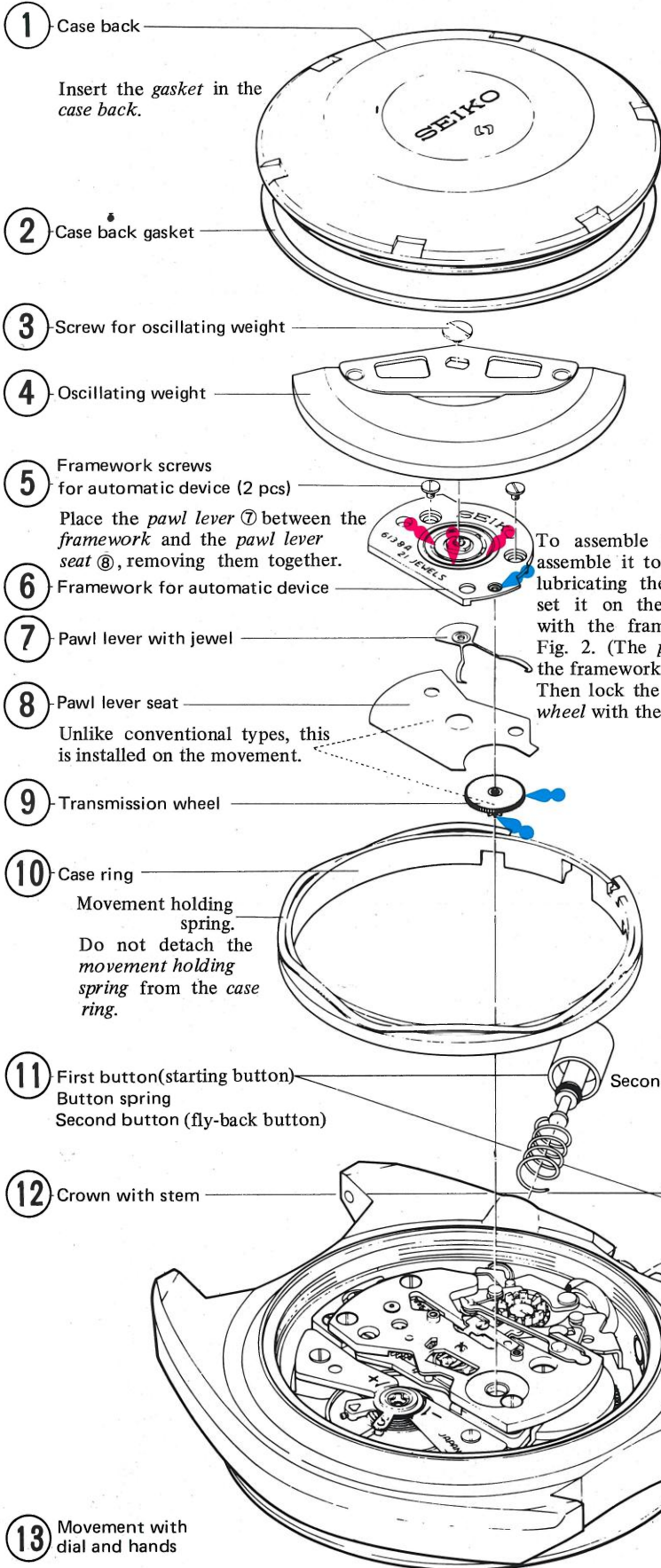
5) Checking and adjusting

Refer to 6139A Technical Guide for checking and adjusting items of second and minute chronograph mechanism.

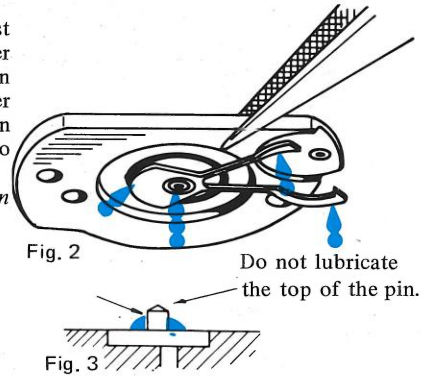
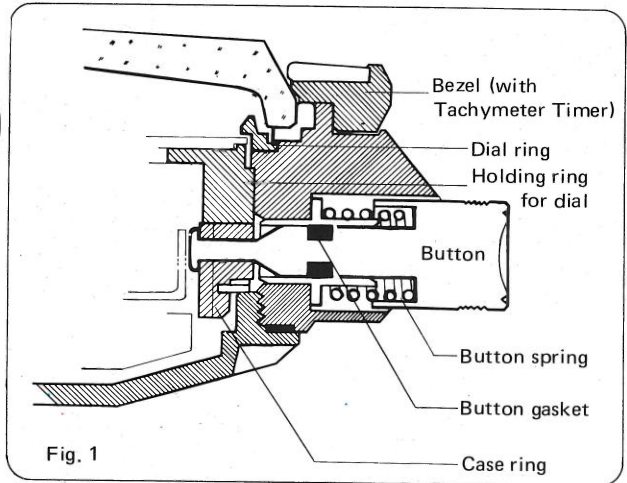


Movement

6138A Automatic Winding Mechanism



Structure of Button Portion



The two buttons ⑪ must be depressed simultaneously to either remove or insert the case ring.



6138A Calendar Mechanism

(Installing the second hand and chronograph minute and hour hands)

1. At the fly-back position, tentatively set the hands on the "0" position.
2. Then repeat fly-back operation to ensure the "0" position. If the hands fail to resume correct position, adjust the hands to resume correct position, adjust the hands while depressing the fly-back button.

However, since the fly-back lever of the chronograph hour hand has a springing characteristic, it prevents the hand from rotating while the hammer button is depressed. Consequently, reinstall the chronograph hour hand so that it coincides with "0" position.

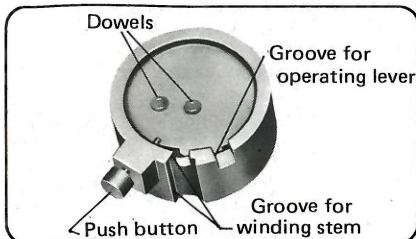
3. Completely push in the hands at the point where they correctly indicate the "0" position.



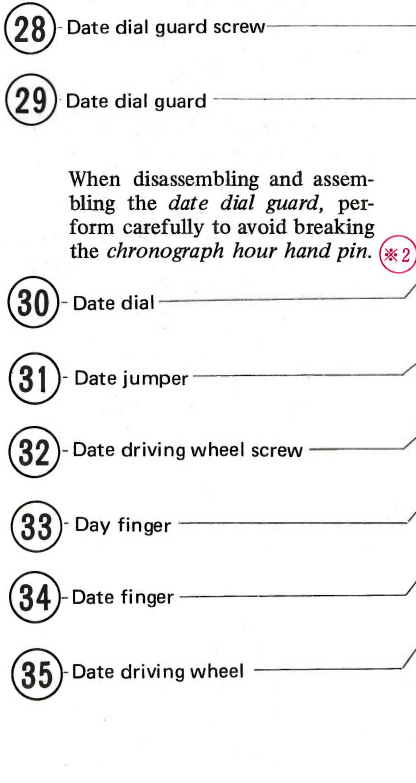
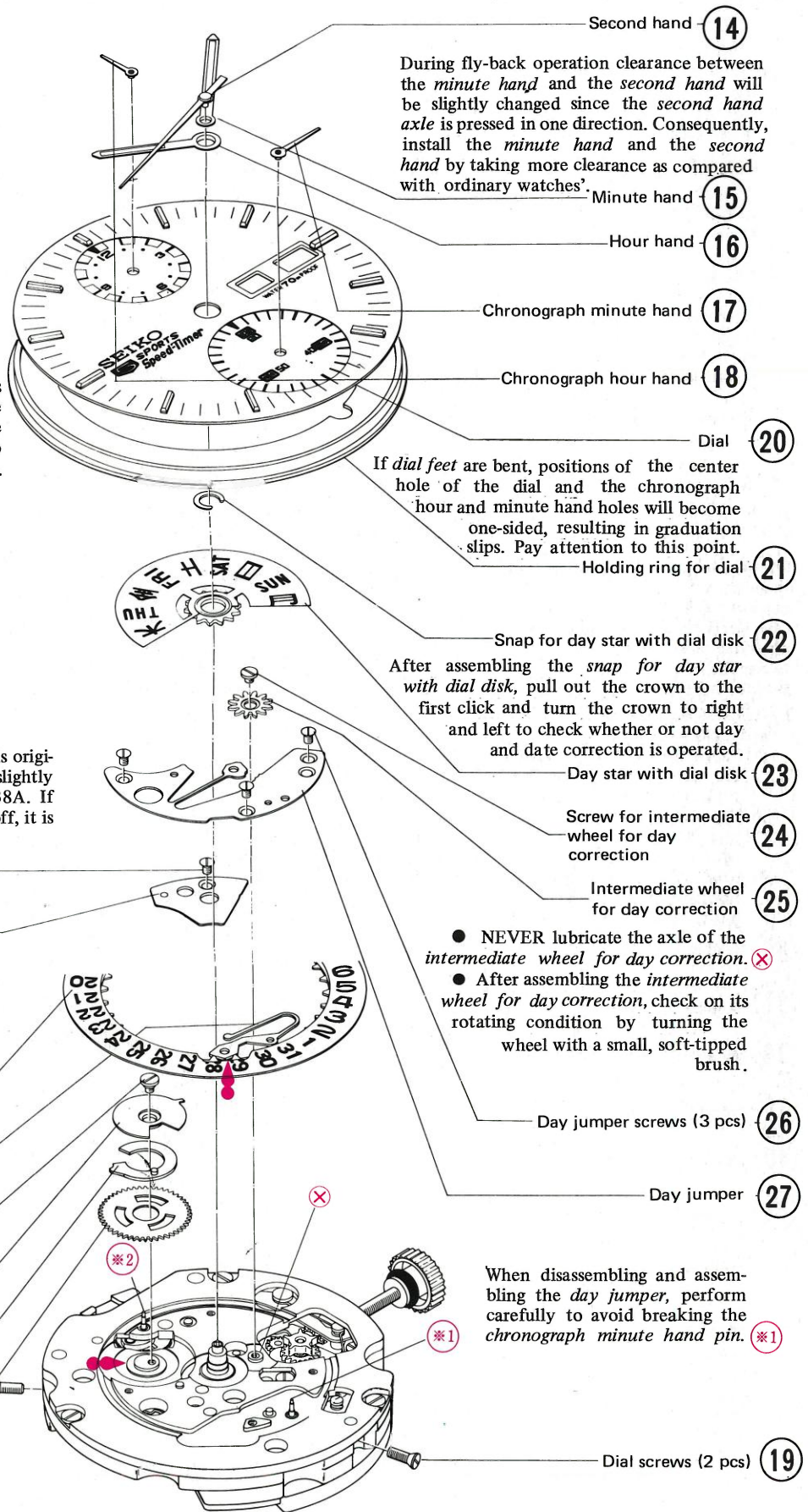
NOTE:

The second hand axle is cut as shown in the diagram. If the second hand is turned by force after completely depressing it to the bottom, the hand will loosen.

SEIKO provides a handy Movement Holder S-500 to facilitate hand-setting.



NOTE: However, since this movement holder is originally for 6139A, the movement is slightly raised when using this holder for 6138A. If the dowels on the holder are scraped off, it is impossible to use for 6139A.



When disassembling and assembling the date dial guard, perform carefully to avoid breaking the chronograph hour hand pin. (*2)

When disassembling and assembling the day jumper, perform carefully to avoid breaking the chronograph minute hand pin. (*1)

6138A Chronograph Mechanism

Explanations on this page are for the nucleus of 6138A. Sufficiently check and adjust the assembled movement.

1. Items to be checked before assembling the jewelled pallet fork and staff, after setting the chronograph bridge.

- 1) Confirm that free running force is transmitted unaffectedly. Even though no roll back motion exists, as long as it functions smoothly there is no problem. And at the same time check the performance of starting and stopping actions of the hour recording wheel by turning over the movement.
- 2) Check for meshing condition of the first and second coupling levers (Refer to 6139A-8).
- 3) Check clearance between the second coupling lever and the intermediate hour recording wheel stop lever pin and their actions.

When stopping, clearance must exist between the second coupling lever and the intermediate hour recording wheel stop lever pin; when starting, the second coupling lever must push and move the intermediate hour recording wheel stop lever pin.

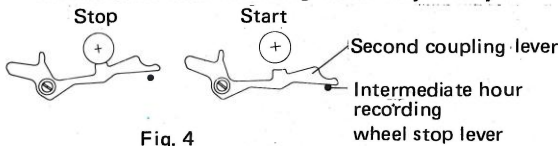


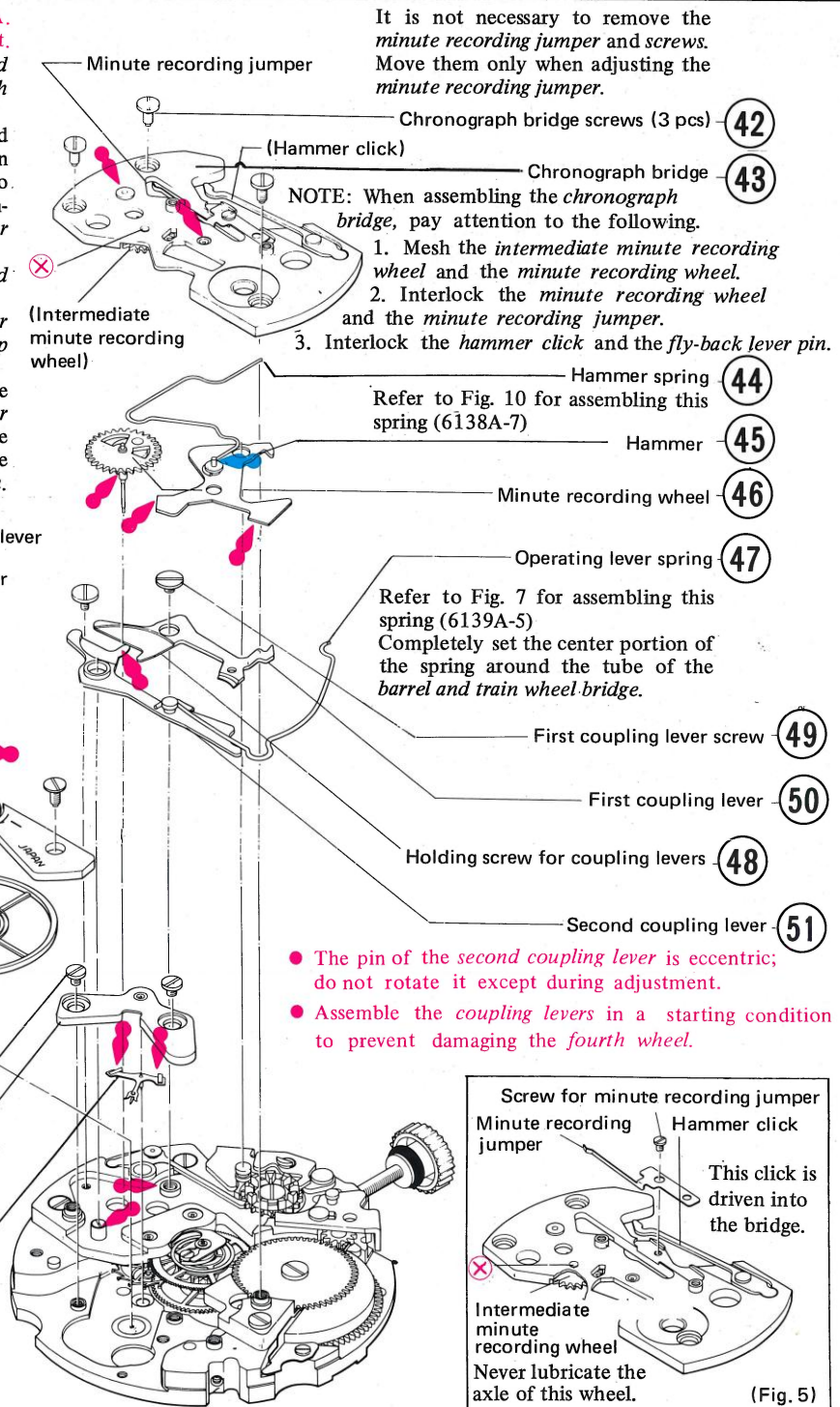
Fig. 4

Should they malfunction, adjust them by turning the second coupling lever axle eccentric pin. In this case, perform this adjustment while observing the delicate clearance between the second coupling lever and the clutch lever.

2. Items to be checked after assembling the balance

- 1) Check for strength and height of the minute recording jumper (Refer to 6139A-8).
- 2) Check for meshing position of the chronograph finger (Refer to 6139A-9).
- 3) Check for contacting condition of the hammer and hearts (Refer to 6139A-10).

- 36 Balance cock screws (2 pcs)
- 37 Balance cock
- 38 Balance complete with stud
- 39 Pallet cock screws (2 pcs)
- 40 Pallet cock
- 41 Jewelled pallet fork and staff



It is not necessary to remove the minute recording jumper and screws. Move them only when adjusting the minute recording jumper.

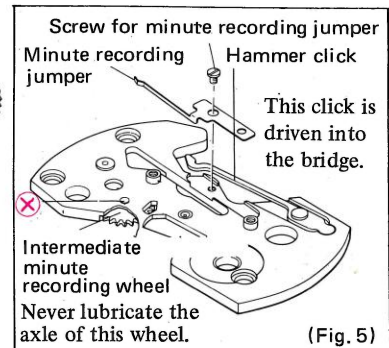
NOTE: When assembling the chronograph bridge, pay attention to the following.

1. Mesh the intermediate minute recording wheel and the minute recording wheel.
2. Interlock the minute recording wheel and the minute recording jumper.
3. Interlock the hammer click and the fly-back lever pin.

Refer to Fig. 10 for assembling this spring (6138A-7)

Refer to Fig. 7 for assembling this spring (6139A-5) Completely set the center portion of the spring around the tube of the barrel and train wheel bridge.

- The pin of the second coupling lever is eccentric; do not rotate it except during adjustment.
- Assemble the coupling levers in a starting condition to prevent damaging the fourth wheel.

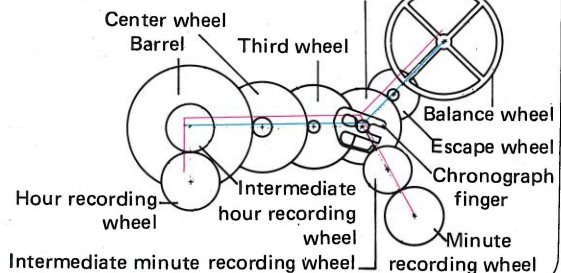


Train wheel (process of force transmission)

Transmission of force when chronograph mechanism is started.
Transmission of force when chronograph mechanism is stopped.

When the minute and second chronographs are started, the force is transmitted to both chronograph and train wheel by the action of the clutch, and when the chronographs are stopped, the force is transmitted only to the train wheel. When the hour chronograph is started, the force is transmitted from the barrel → friction spring for intermediate hour recording wheel → intermediate hour recording wheel → hour recording wheel. When the hour chronograph is stopped, force transmission to the hour recording wheel is stopped by a slip of the friction spring for intermediate hour recording wheel.

Center chronograph wheel (Fourth wheel)

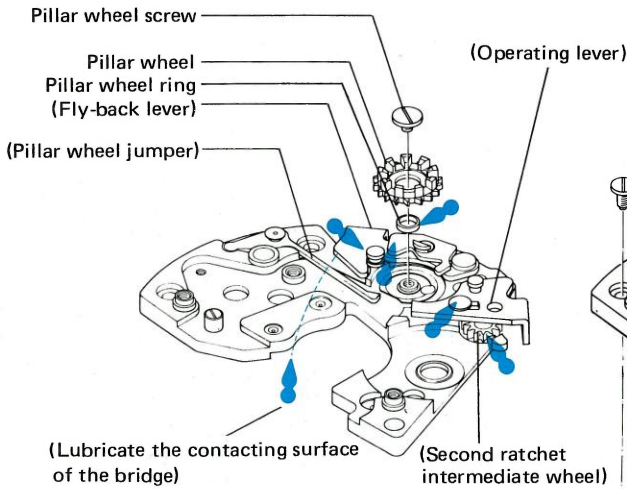
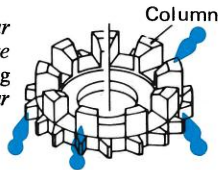


6138A Train Wheel

Lubricating the pillar wheel

To prevent chipping, install the pillar wheel on the barrel and train wheel bridge before assembling the latter.

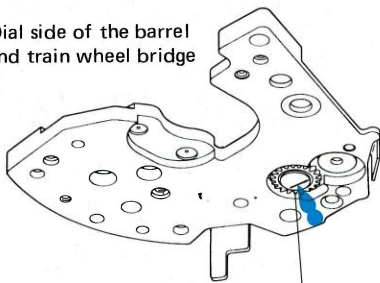
Assemble the pillar wheel to the bridge while interlocking with the pillar wheel jumper.



(Lubricate the contacting surface of the bridge)

Operating lever, fly-back lever, pillar wheel jumper, second intermediate ratchet wheel, and crown wheel are driven into the barrel and train wheel bridge.

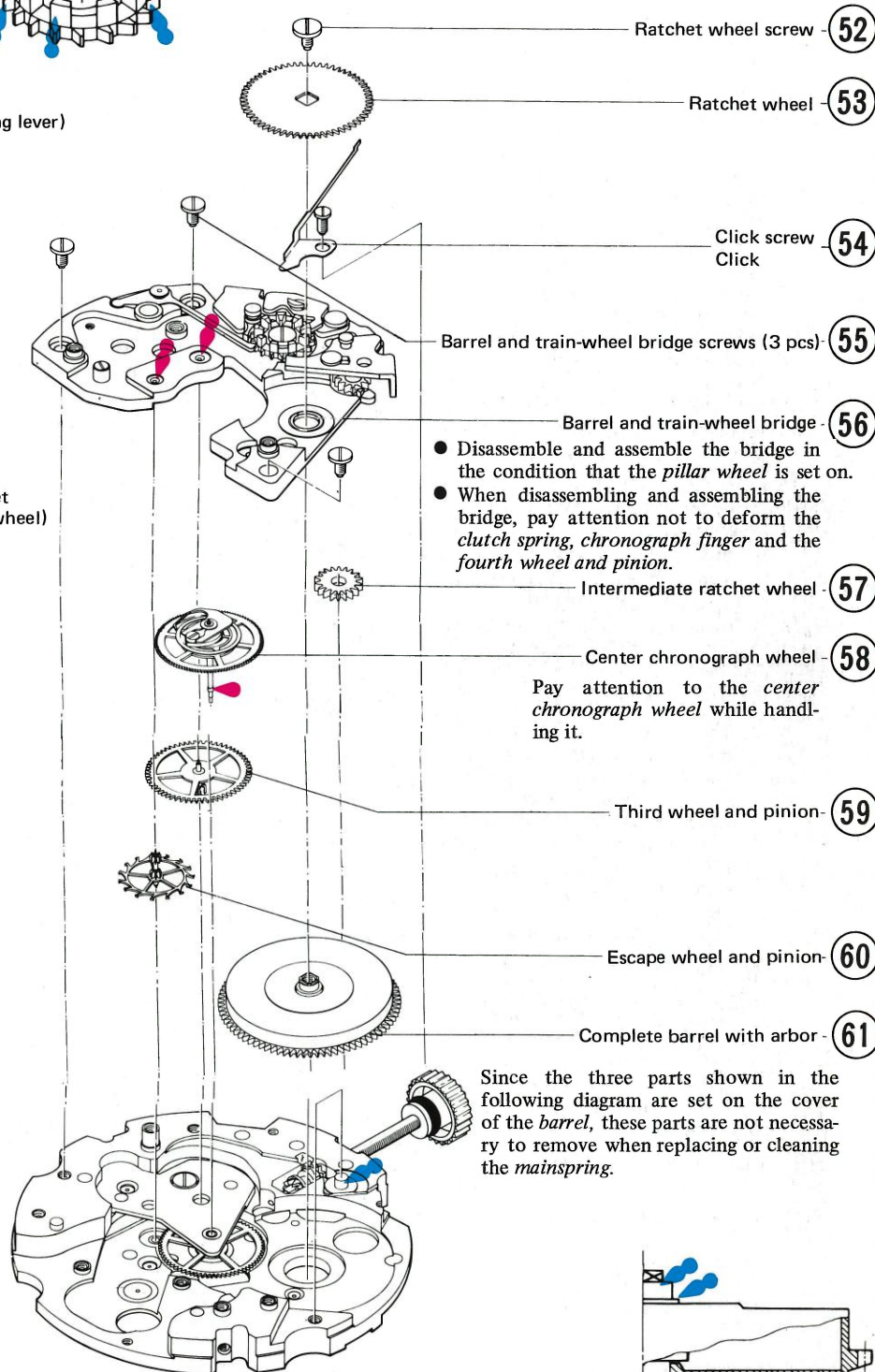
Dial side of the barrel and train wheel bridge



(Crown wheel)

Lubricating the fourth wheel

Apply oil between the clearance of the fourth wheel pinion and the axle.



- Disassemble and assemble the bridge in the condition that the pillar wheel is set on.
- When disassembling and assembling the bridge, pay attention not to deform the clutch spring, chronograph finger and the fourth wheel and pinion.

Since the three parts shown in the following diagram are set on the cover of the barrel, these parts are not necessary to remove when replacing or cleaning the mainspring.

(Friction spring for intermediate hour recording wheel)
(Intermediate hour recording wheel)
(Intermediate hour recording wheel ring)

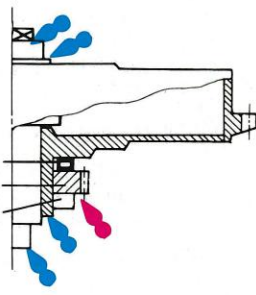


Fig. 7

6138A Hour Chronograph Mechanism

62 Calendar plate screws (3 pcs)

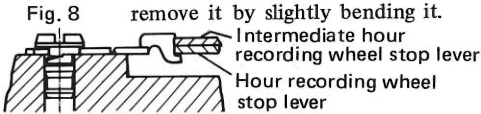
After tightening the *calendar plate* screws, check whether or not each lever operates smoothly by pressing the portion marked with *1 on the *hour fly-back lever*. Causes of malfunctions are considered to come from defective assembly and/or lever warp when replaced with a new one.

63 Calendar plate

Pay attention not to break or bend the *hour hand axle* *2 when attaching or detaching the *calendar plate*. When assembling the *calendar plate*, check on pivoting of the *hour hand axle*, and the interlocking condition between the *hour wheel* and the *intermediate date wheel*. If the *hour fly-back lever* protrudes to the outer circumferential side, the *calendar plate* cannot be assembled. Thus, assemble the *calendar plate* while pushing the *hour fly-back lever* toward the center.

67 Spring for hour recording wheel stop lever

1. The *hour recording stop lever axle* is designed as shown in Fig. 8; when detaching the *spring*, remove it by slightly bending it.



2. The *hour recording stop lever spring axle* is an eccentric pin. Do not turn it as it is not screw. If it is turned inadvertently, always correct it so that the groove of the *eccentric pin* (arrow mark) faces the center of the *hour recording wheel*. Correct it in a direction that spring force becomes strong as illustrated left in Fig. 9.



68 Intermediate hour recording wheel stop lever

69 Hour recording wheel stop lever

70 Hour recording wheel

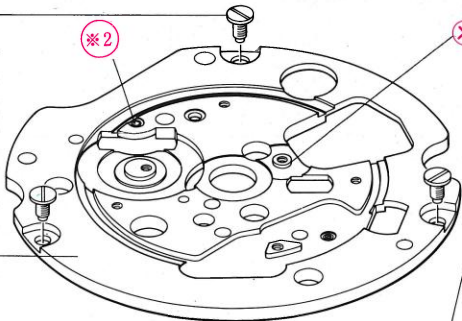
Pay attention not to scratch the teeth of the *hour recording wheel* when handling it.

71 Intermediate date wheel

Assemble the *intermediate date wheel* with the pinion positioned upward.

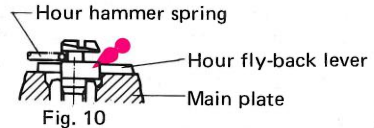
72 Hour wheel

The *hour recording stop lever spring axle* is an eccentric pin; do not turn it. If it is turned inadvertently, adjust it by referring to Fig. 9.



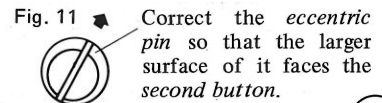
Hour hammer spring **64**

Refer to Fig. 15 in 6138A-7 for the set position of the *hour hammer spring*. A cross section diagram of the portion around the *eccentric pin* of the plate is shown in the following diagram. Correctly set the *eccentric pin* in the grooved portion.



Hour fly-back lever **65**

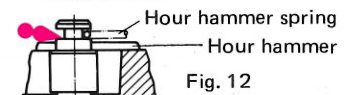
1. Refer to Fig. 15 in 6138A-7 for the set position of the *hour fly-back lever*. The cross section diagram is shown in Fig. 10. Correctly set it to the eccentric portion.
2. Do not turn the *eccentric pin* of the *hour fly-back lever*. If it is turned inadvertently, correct it as shown in Fig. 11.



Hour hammer **66**

Refer to Fig. 17 in 6138A-8 and the following diagram for the set position of the *hour hammer*.

1. Set position of the *hour hammer axle*



2. Interlocking with the *intermediate hour recording wheel stop lever*

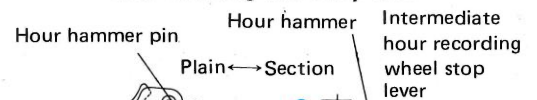


Fig. 13

Fig. 14

Refer to Fig. 12

Minute wheel **73**

Cannon pinion **74**

The *hour fly-back lever axle* is an eccentric pin; do not turn it. If it is turned inadvertently, adjust it by referring to Fig. 10.

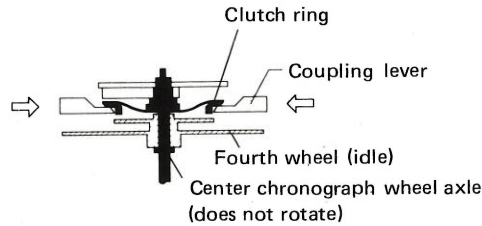
Center wheel **77**

Center wheel bridge **76**

Center wheel bridge screw **75**

6138A Operation of Chronograph Mechanism

Stopping of chronograph minute and second hands



Stopping

The *minute and second recording wheels* are stopped when the *clutch ring* is raised through action of the *coupling levers*. The *hour recording wheel* comes to a halt by a slip of the *hour recording friction spring* of the barrel. The slip comes from the fact that the *hour recording wheel stop lever* brakes the *hour recording wheel* by the *spring for hour recording wheel stop lever*.

Stopping of chronograph hour hand

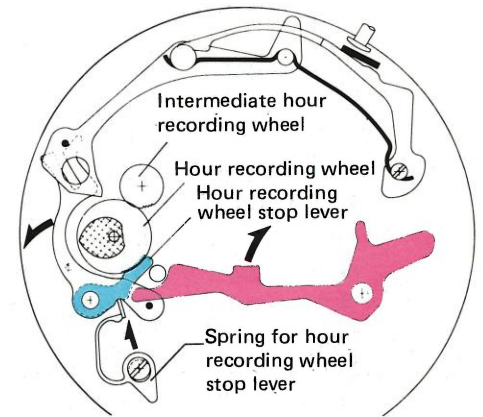
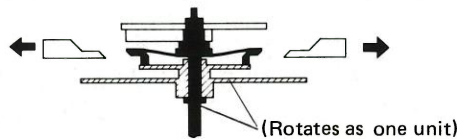


Fig. 15

Starting of chronograph minute and second hands

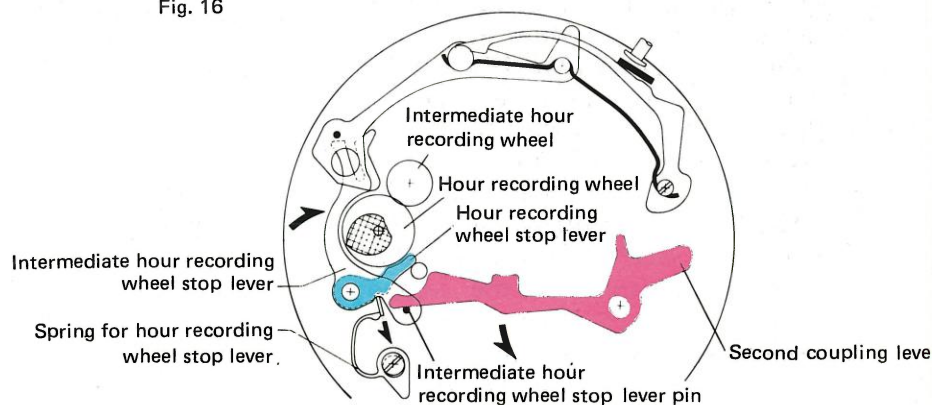


Starting of chronograph hour hand

Fig. 16

Starting

The *minute and second recording wheels* are started when the *coupling levers* are separated from the *clutch ring*. Simultaneously, the *second coupling lever* pushes the *intermediate hour recording wheel stop lever pin*, revolving the *intermediate hour recording wheel stop lever* in the → direction. And then, the force of the *spring for hour recording wheel stop lever* is not transmitted to the *hour recording wheel stop lever* to release the brake of the *hour recording wheel* and let it start.



6138A Operation of Chronograph Mechanism

Resetting

1. Resetting of the chronograph minute hand and second hand

When pressing the *second button*, the force is transmitted to *fly-back lever* → *intermediate fly-back lever* → *hammer*, and the *hammer* strikes the *minute heart* and the *second heart* to reset the hands to "0" position.

2. Resetting of the chronograph hour hand

Simultaneously with the above, the *fly-back lever* presses the *hour fly-back lever* and the force is transmitted to the *hour hammer* to reset the *chronograph hour hand* to "0" position. At this moment, the *intermediate hour recording wheel stop lever* revolves in the → direction by action of the *hour hammer pin*, and the *hour recording wheel* is released. When the *second button* is released, the *chronograph hour hand* returns to a stopped condition.

Resetting of chronograph minute hand and second hand

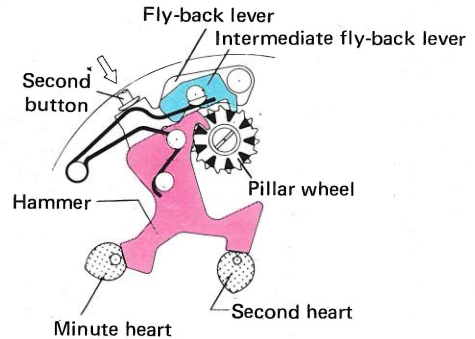
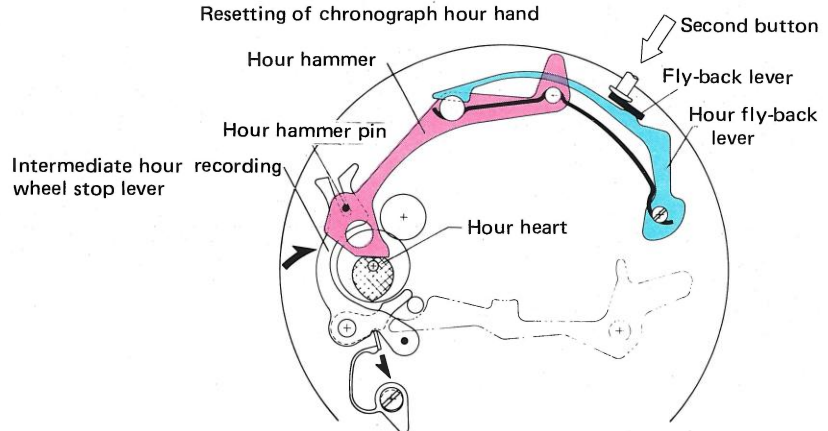


Fig. 17

Resetting of chronograph hour hand



Fly-back safety mechanism

This mechanism protects the movement from the shock generated by the *second button*. End portions of the *hammer* and the *intermediate fly-back lever* are located outside the column during starting condition. When the *second button* is depressed, the end portion of the *intermediate fly-back lever* slips among the columns of the *pillar wheel* (as shown in Fig. 18), and the force is not transmitted beyond the *hammer*. On the other hand, the *hour hammer* does not move because the pin located on its tip strikes the *intermediate hour recording wheel stop lever*. At this moment, momentum of the *second button* is absorbed by a spring characteristic of the *hour fly-back lever*. Safety action is exhibited by integration of the above-mentioned operations.

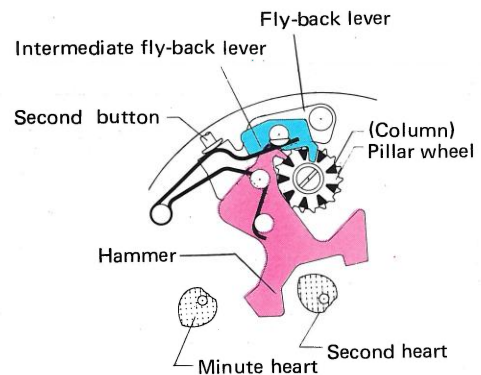
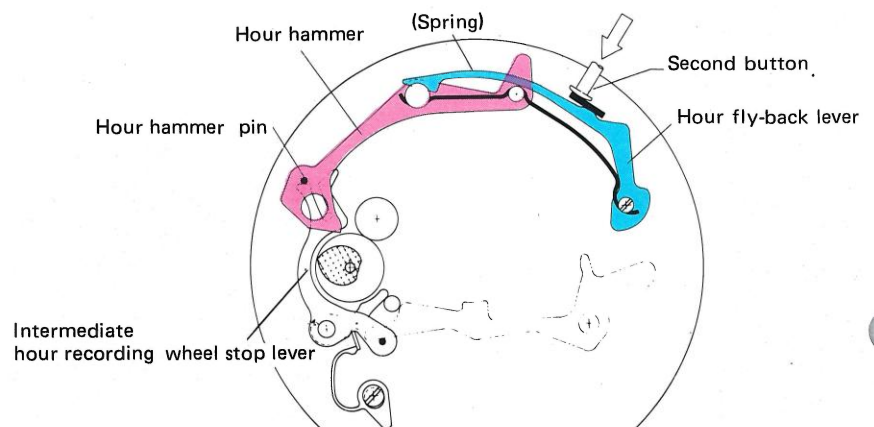
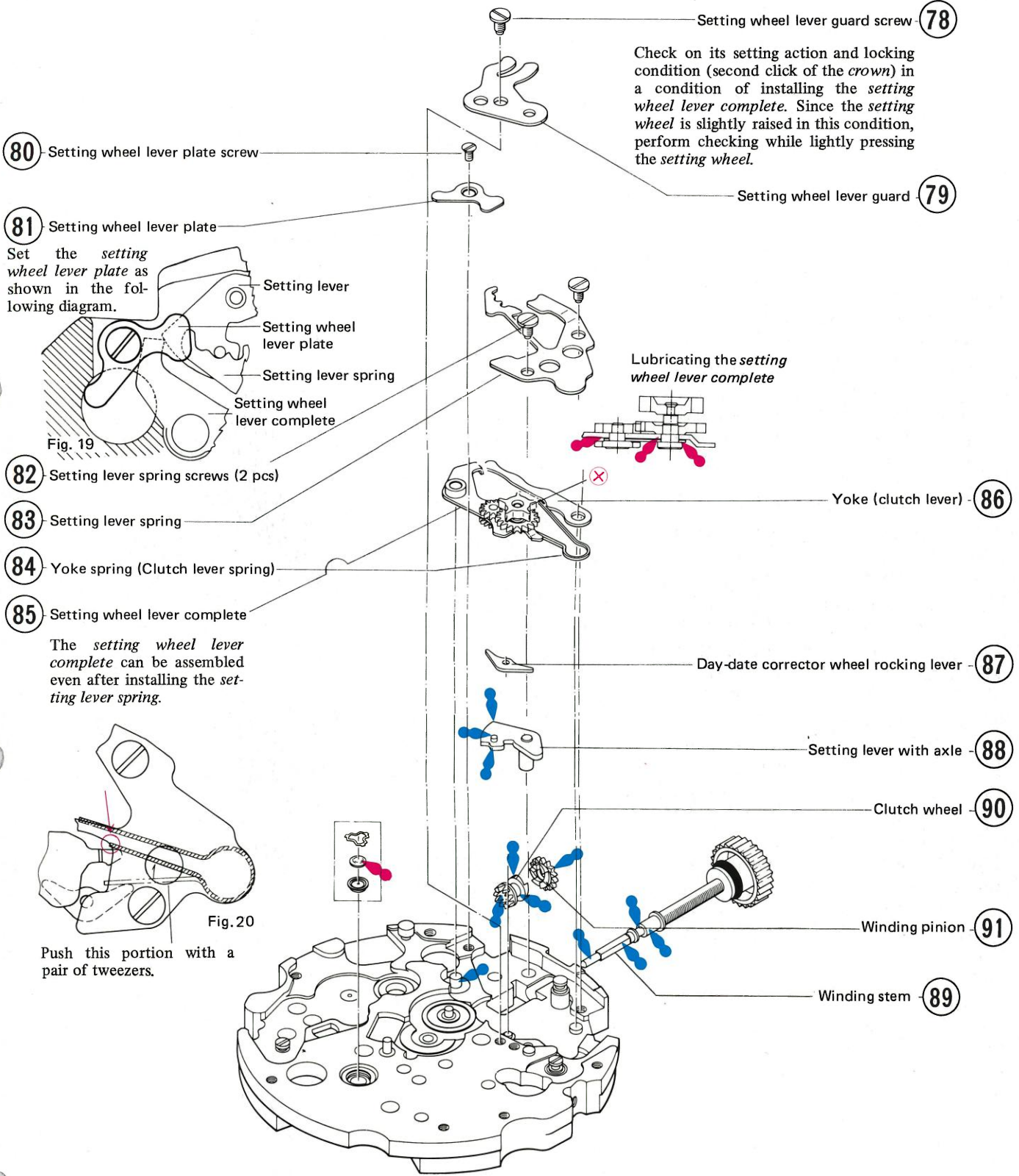


Fig. 18



6138A Setting Mechanism



6138A Setting Mechanism

Ordinary position of crown (main-spring winding)

The *crown wheel* and the *second intermediate ratchet wheel* are caulked on the *barrel* and *train wheel bridge*. The *intermediate ratchet wheel* is supported by a pin mounted on the plate.

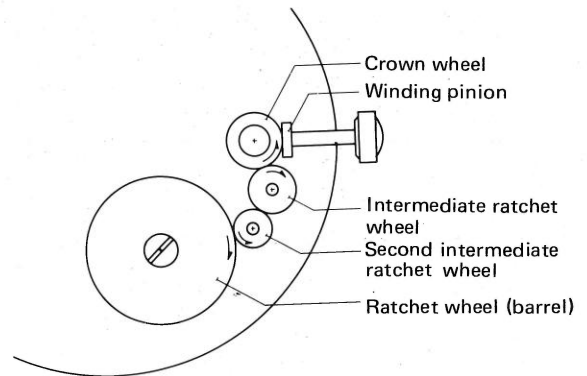


Fig. 21

Second position of crown (day and date correction)

1. Clockwise – Date correction:

When turning the *crown* to the right (clockwise), the *correcting gear* moves to the *date dial* side and interlocks with it, thus date is corrected. Force transmission is through *crown* → *clutch wheel* → *setting wheel* → *correcting gear* → *date dial*.

2. Counterclockwise – Day correction

When turning the *crown* to the left (counterclockwise), the *correcting gear* moves to the *day star with dial disk* side and interlocks with the *intermediate wheel for day correction*, and day is corrected. Force is transmitted through *crown* → *clutch wheel* → *setting wheel* → *correcting gear* → *intermediate wheel for day correction* → *day star with dial disk*.

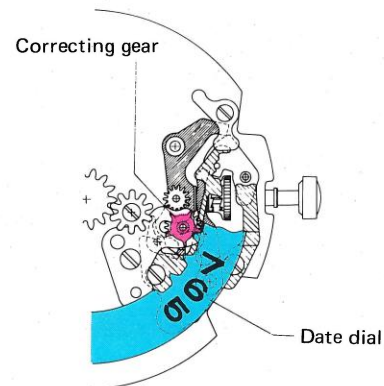


Fig. 22

Third position of crown (setting time)

The *setting wheel lever complete* moves to the *minute wheel* side by action of the *setting lever with axle*, and the *intermediate setting wheel* interlocks with the *minute wheel*, hand is set correctly. Simultaneously, motion of the *setting wheel lever complete* is transmitted to the *day-date correction wheel rocking lever*, and the *correcting gear* attains a position where it interlocks neither the *date dial* nor *intermediate wheel for day correction* by action of the *setting wheel lever complete* and the *day-date correction wheel rocking lever*.

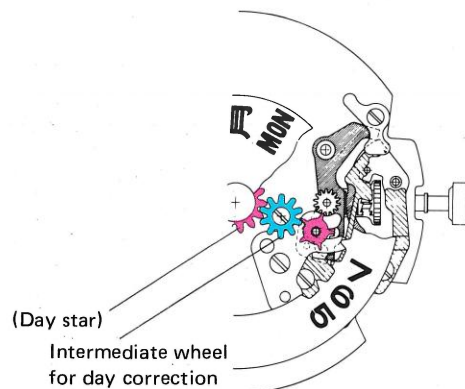


Fig. 23

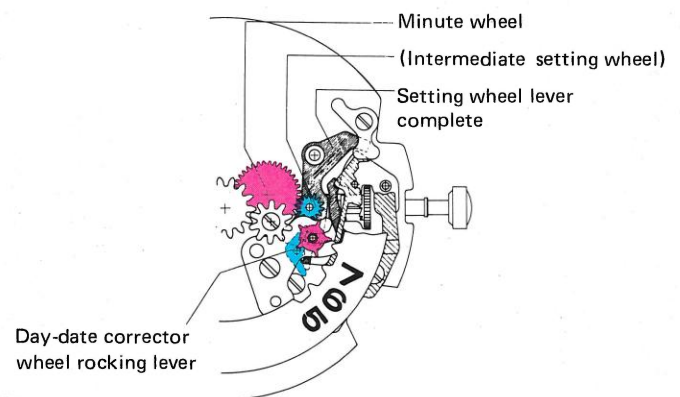


Fig. 24

6139A Automatic Chronograph

1 Specifications

Casing diameter	27.00 mm
Height	6.65 mm
Vibrations per hour	21,600
Automatic winding	
Calendar (Day & date, bilingual change-over mechanism for day indication, instant day & date setting device)	
Chronograph (1/5 second, one revolution in 60 seconds, 30 minutes totalizer, accumulated)	

2 Features

An advanced automatic winding chronograph

6139A Automatic Chronograph is a high-grade functional watch in which a chronograph mechanism and an automatic winding mechanism are compactly assembled. Addition of a calendar mechanism does not affect watch size and thickness.

Easy-to-use chronograph mechanism

The second hand and minute recorder can be activated by depressing the first button. Measured time can be accumulated just as with a regular chronograph.

Either one of two languages provided can be chosen to indicate the days of the week.

Numerous function and design features

In addition to 30- to 70-meter depth waterproofing (70-meter depth waterproof watch employs HARDLEX special reinforced glass), a variety of functions are provided such as tachymeter, pulsimeter, and rotating dial ring.

3 Disassembly and assembly

Disassemble the watch according to Figs.

①→⑦⑤

Assemble by reversing the above: Figs.

⑦⑤→①

Installation of the automatic winding mechanism varies compared with conventional watches.

The automatic winding mechanism should be installed after setting the movement with hands in the case.

4 Lubrication

Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and lubricating points.

▶ Moebius Synt-A-Lube

▶ Seiko watch oil S-4

Oil quantity

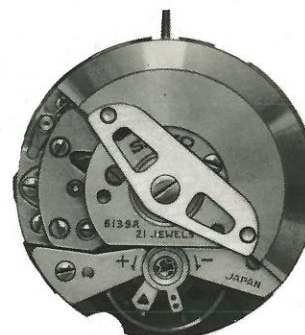
▶ Extremely small quantity

▶▶ Normal quantity

▶▶▶ Sufficient quantity

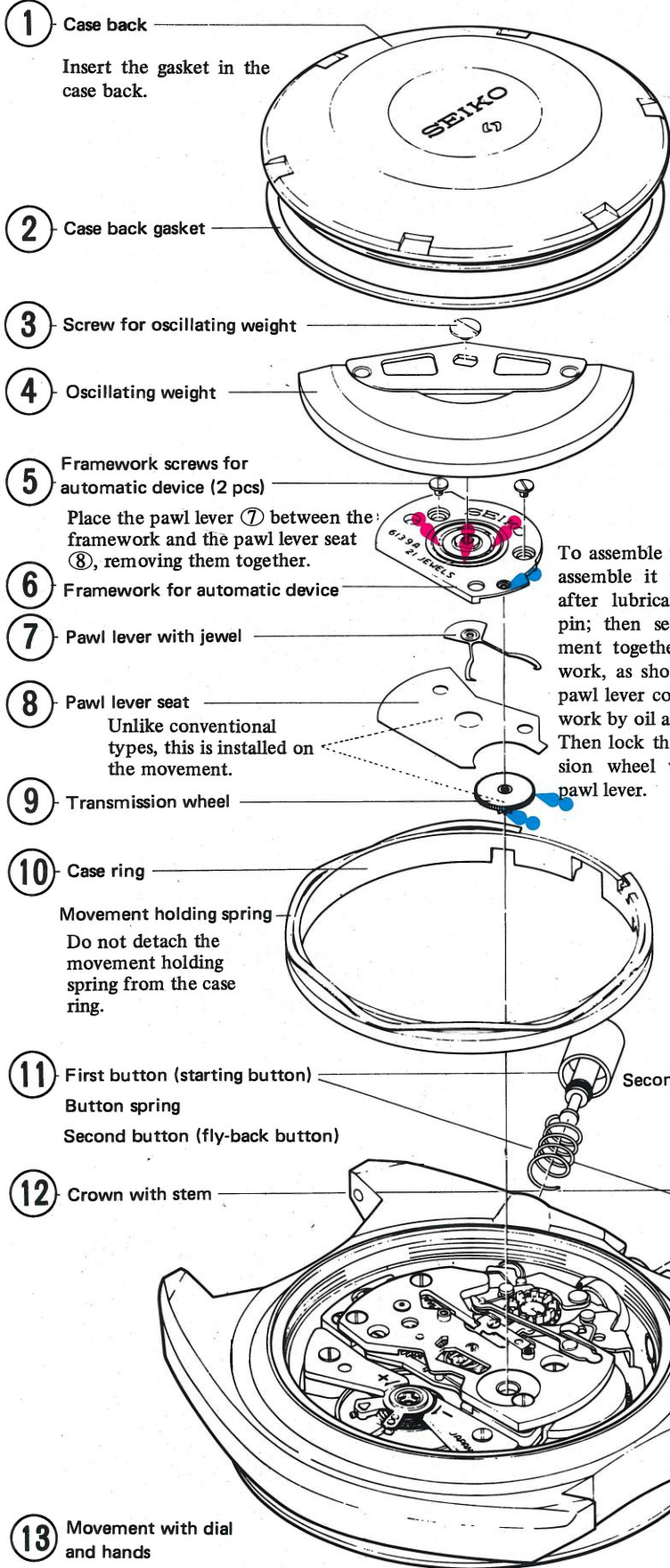
✕ Oil must not be applied

Note: Unindicated portions do not require lubrication.

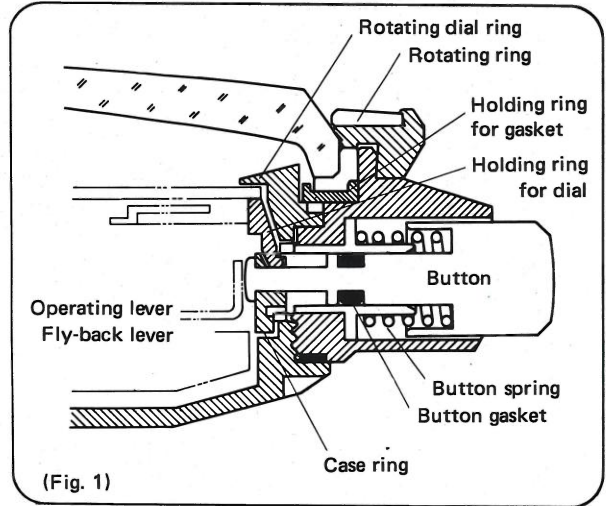


Movement

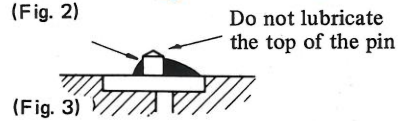
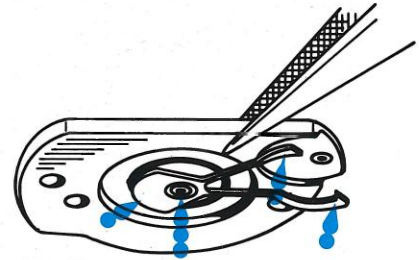
6139A Automatic Winding Mechanism



Structure of Button Portion



To assemble the pawl lever, first assemble it to the framework after lubricating the eccentric pin; then set it on the movement together with the framework, as shown in Fig. 2. (The pawl lever coheres to the framework by oil adhesion.) Then lock the teeth of transmission wheel with the teeth of pawl lever.



The two buttons 11 must be depressed simultaneously to either remove or insert the case ring.



6139A Calendar Mechanism

<Installing the second hand and chronograph minute hand>

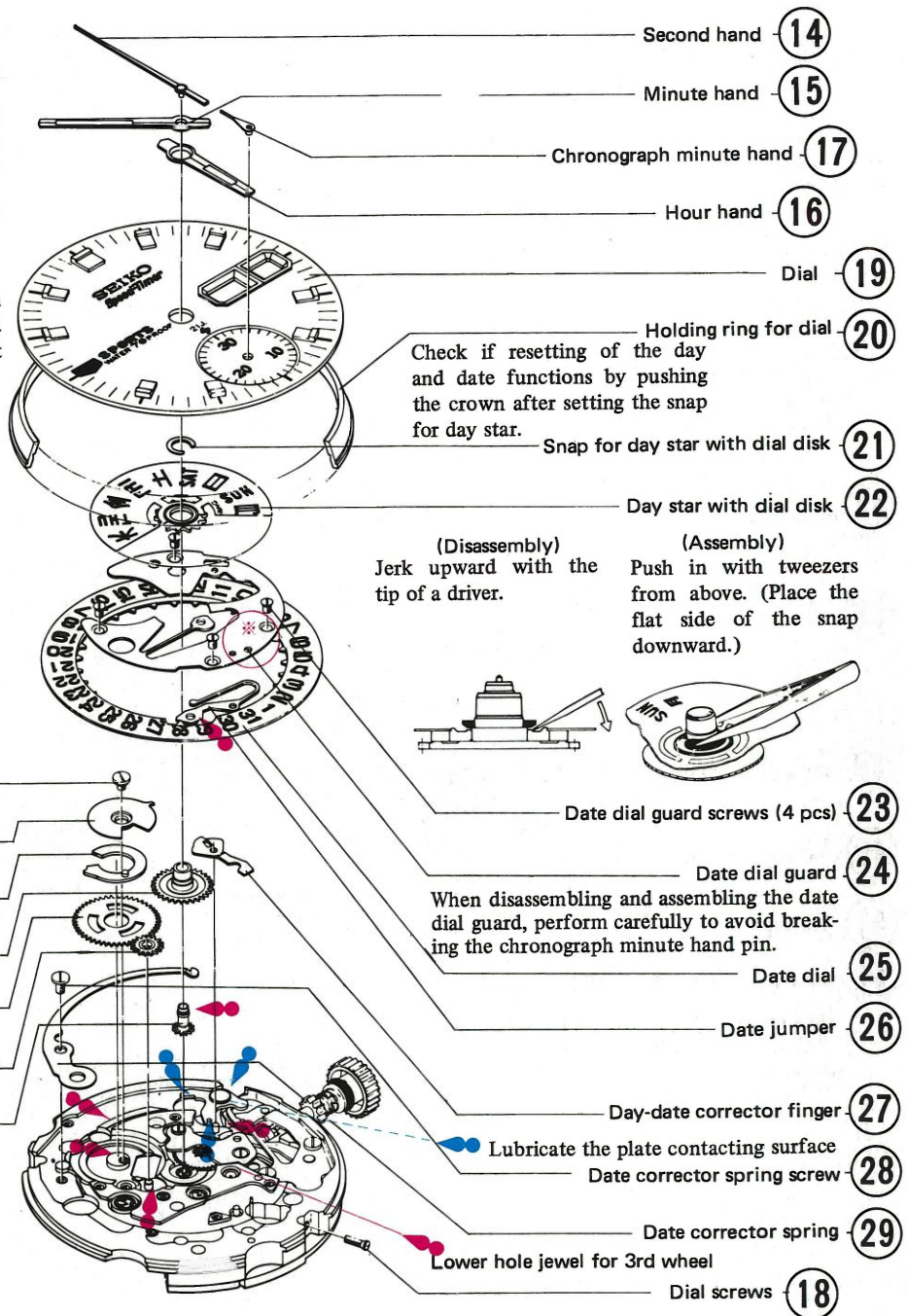
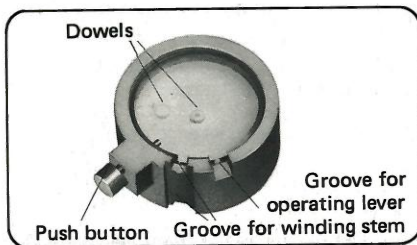
- (1) At the fly-back position, tentatively set the hands on the "0" position.
- (2) Then repeat fly-back operation to foolproof the "0" position. If the hands fail to resume correct position, adjust the hands while depressing the fly-back button.
- (3) Completely push in hands at the point where they correctly indicate the "0" position.

NOTE:



The second hand axle is cut as shown in the diagram. If the second hand is turned by force after completely depressing it to the bottom, the hand will loosen.

SEIKO provides a handy Movement Holder S-500 exclusively for 6139A, to facilitate hand-setting.



Calendar Mechanism

Day and date correction:

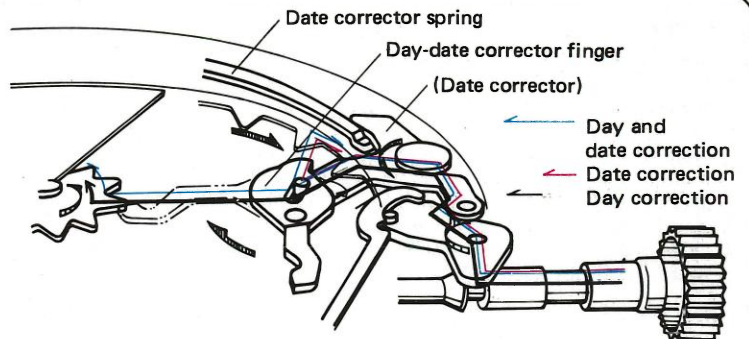
When fully depressing the crown from the ordinary position, the day and date are quickly forwarded by interlocking of stem, setting lever, date corrector, and day-date corrector finger.

Date correction:

When stopping the crown at an intermediate position, only the date changes.

Day correction:

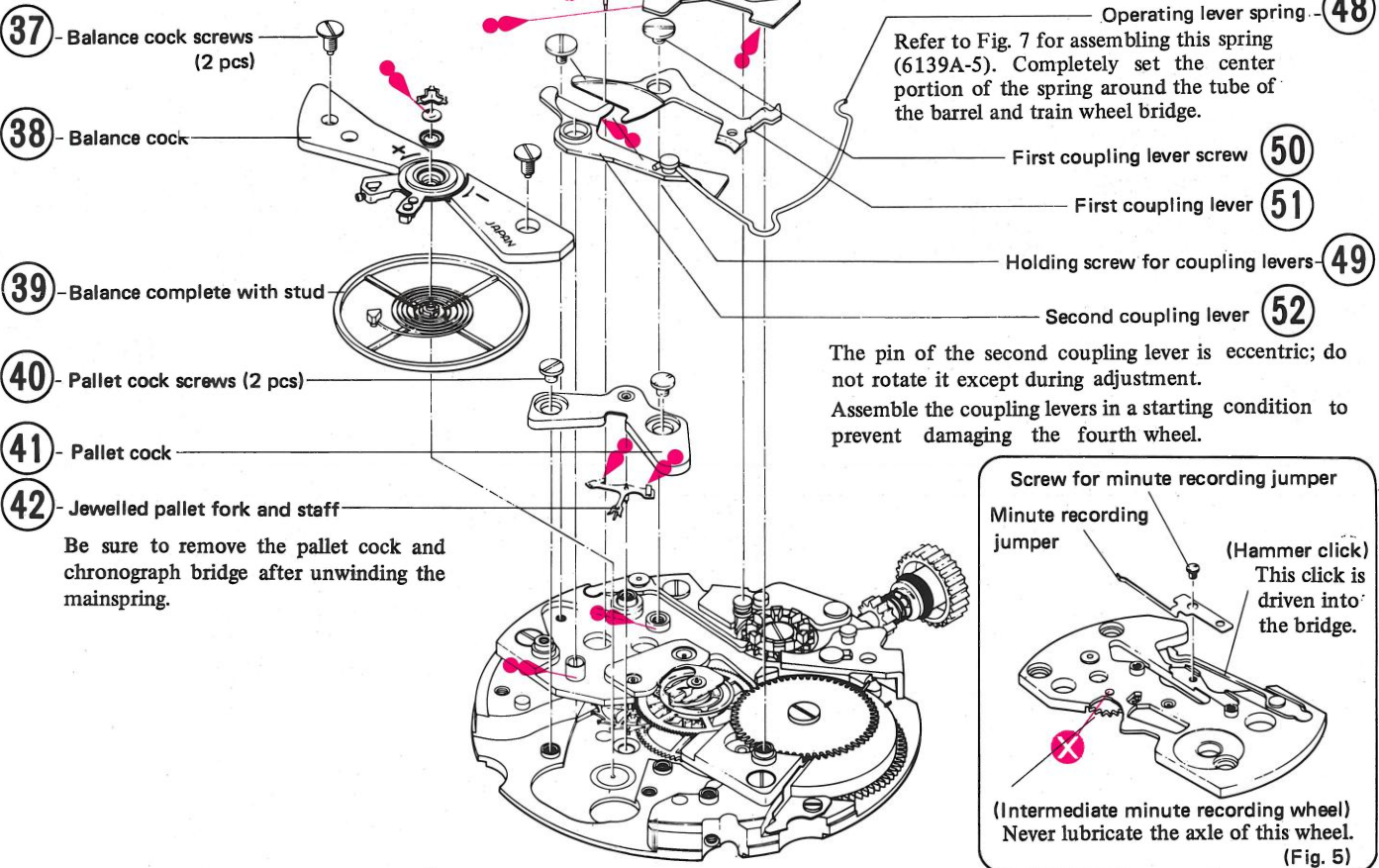
Further depress the crown from the intermediate position to change only the week day indicated in English (or the other language being used). Once set, only the chosen language appears daily.



6139A Chronograph Mechanism,

1. Items to be checked before assembling the jewelled pallet fork and staff, after setting the chronograph bridge.
 - (1) Confirm that free running force is transmitted unaffectedly. Even though no roll back motion exists, as long as it functions smoothly there is no problem.
 - (2) Check for meshing condition of the first and second coupling levers (6139A-8).
2. Items to be checked after assembling the balance
 - (1) Check for strength and Reight of the minute recording jumper (6139A-8).
 - (2) Check for meshing position of the chronograph finger (6139A-9).
 - (3) Check for contacting condition of the hammer and hearts (6139A-10).

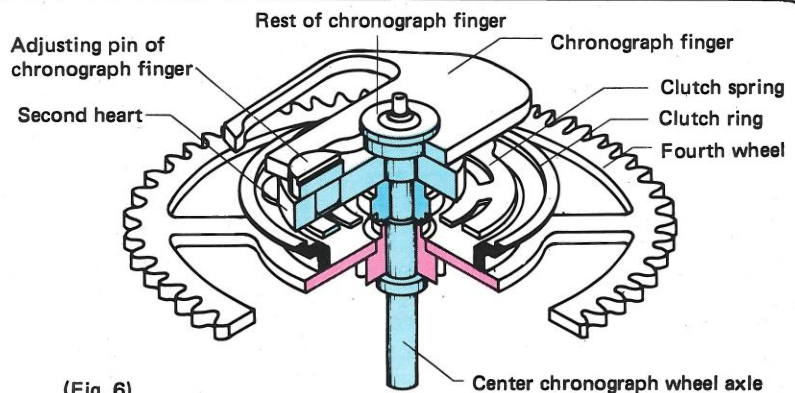
It is unnecessary to remove the minute recording jumper and screws. Move them only when adjusting the minute recording jumper.



Center Chronograph Wheel

The center chronograph wheel is composed of the fourth wheel and pinion, clutch ring, clutch spring, second heart, and center chronograph wheel axle having a chronograph finger.

While the clutch ring is pressed to the fourth wheel by a clutch spring, the fourth wheel and center chronograph wheel axle revolve as one body. When the clutch ring is separated from the fourth wheel, the center chronograph wheel axle comes to a halt, and only the fourth wheel revolves individually.



(Fig. 6)

6139A Operation of Chronograph Mechanism

Starting

When depressing the first button, the pillar wheel is forwarded one tooth and the pillar wheel contacting portion of the first coupling lever falls between the columns, and the first and second coupling levers are separated from the clutch ring. The clutch ring is pressed to the fourth wheel by the clutch spring, and the second hand starts moving.

When the second hand makes a complete turn, the chronograph finger forwards the minute recording wheel one tooth through the intermediate minute recording wheel, operating the minute hand one graduation.

Stopping

When depressing the first button in a started condition, the first and second coupling levers operate, raising the clutch ring. The clutch ring is separated from the fourth wheel, and the second hand comes to a halt. This time, the fourth wheel continues to rotate.

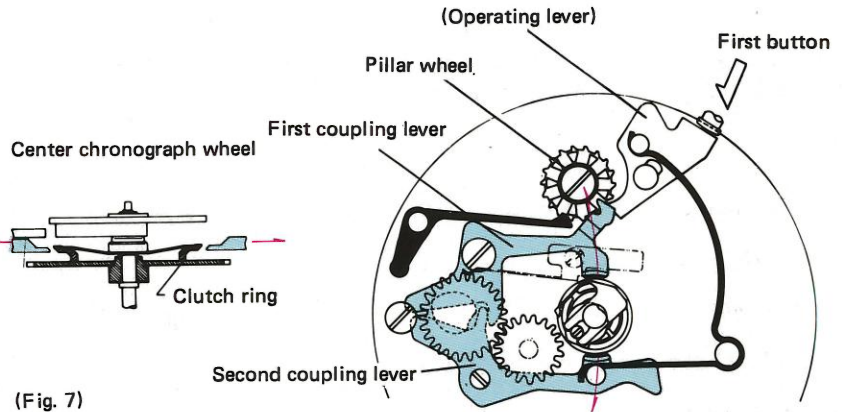
Accumulation

When further depressing the first button in a stopped condition, the mechanism returns to a starting condition (Fig. 7), and the chronograph hands restart from its stopped position, the measured time being accumulated.

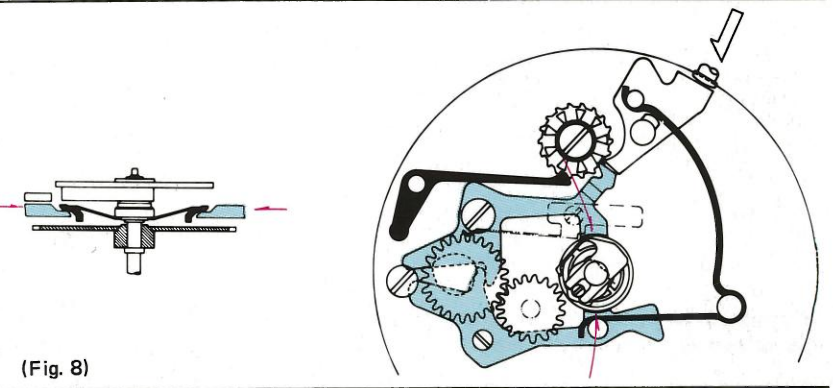
Resetting

When depressing the second button in a stopped condition, the hammer is operated through the fly-back lever striking the second and minute hearts, and the hands are reset to the "0" position.

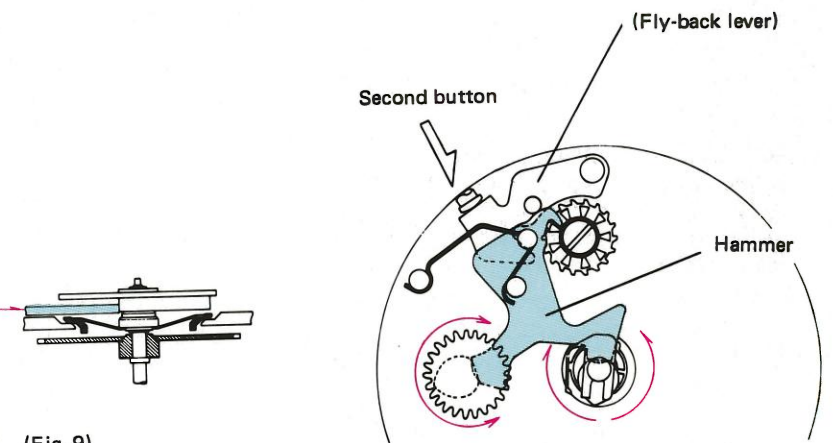
(When the hammer is on the column, i.e. the hands are in motion, the second button (fly-back button) cannot be depressed.)



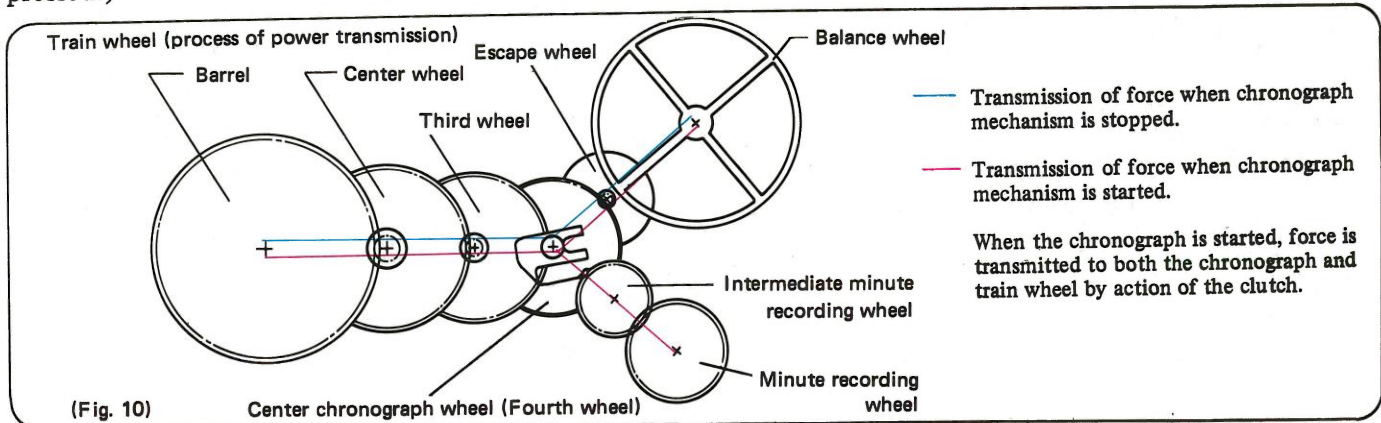
(Fig. 7)



(Fig. 8)



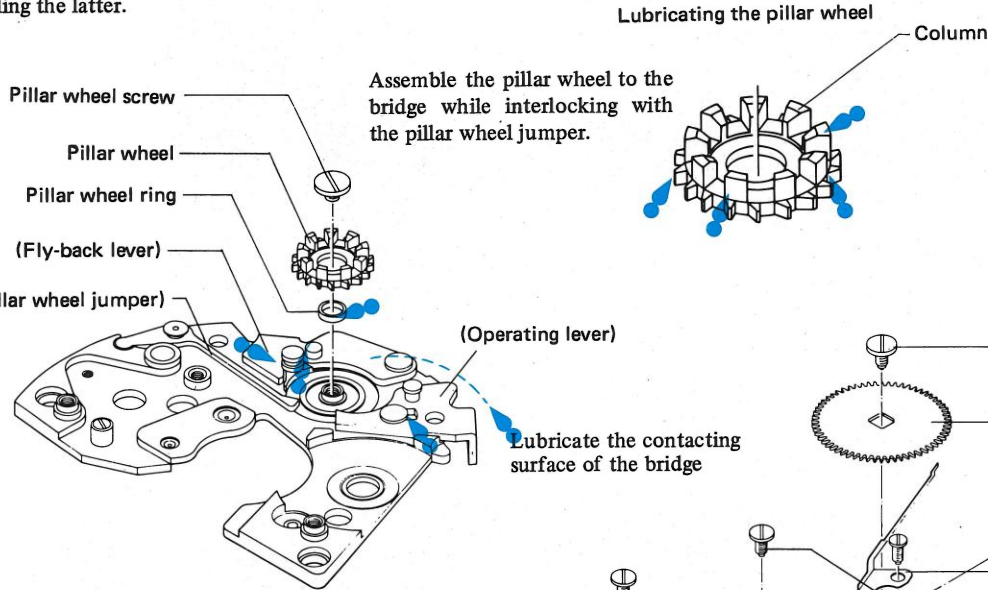
(Fig. 9)



(Fig. 10)

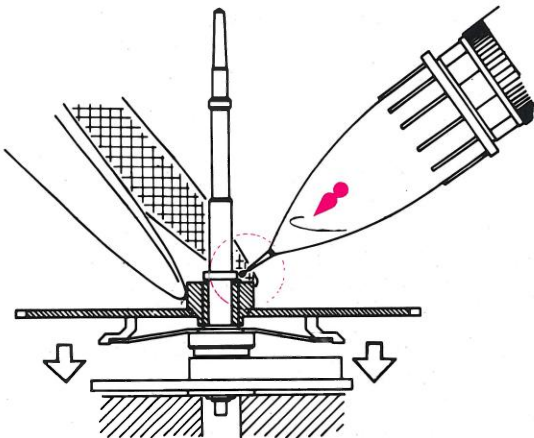
6139A Train Wheel

To prevent chipping, install the pillar wheel on the barrel and train wheel bridge before assembling the latter.

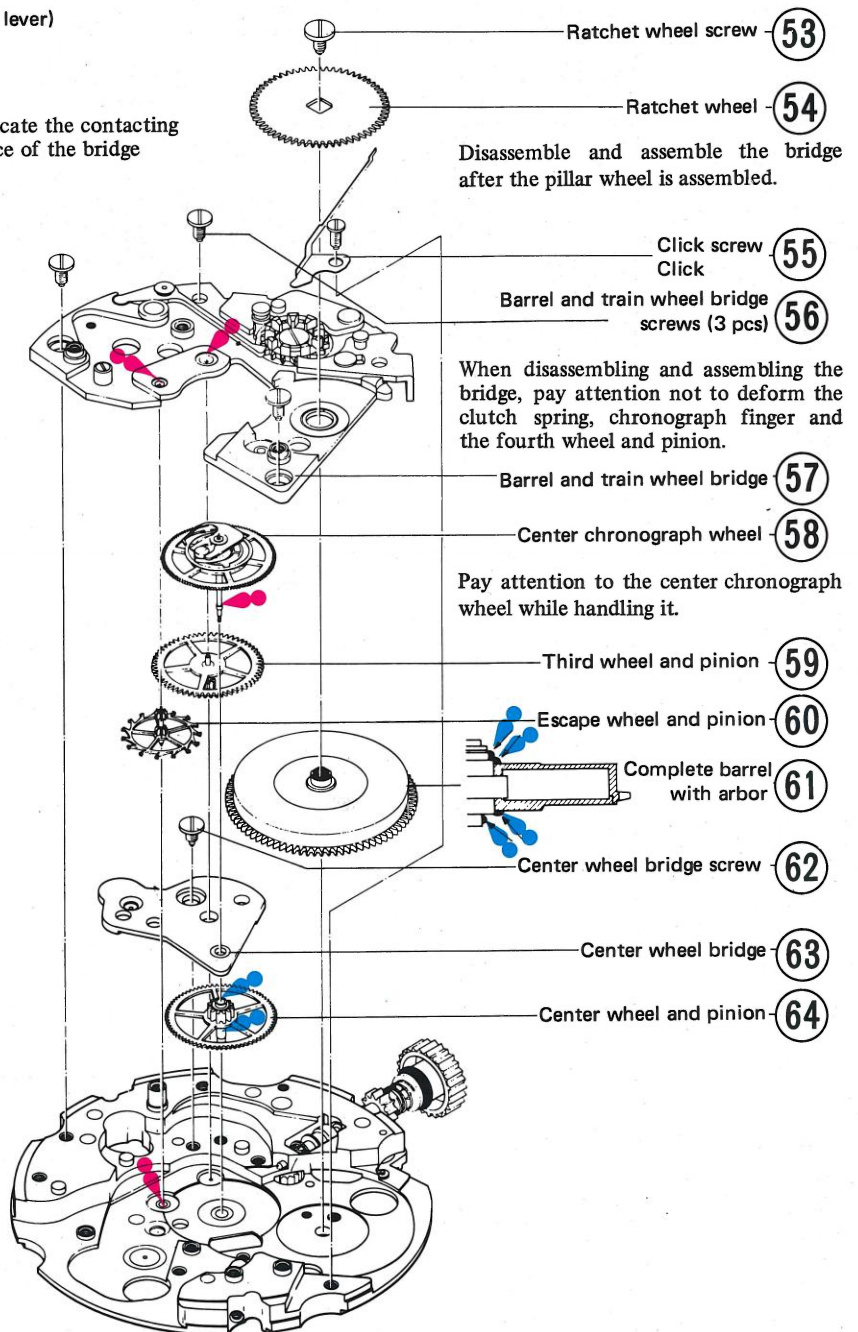


The operating lever, fly-back lever, and pillar wheel jumper are driven into the bridge.

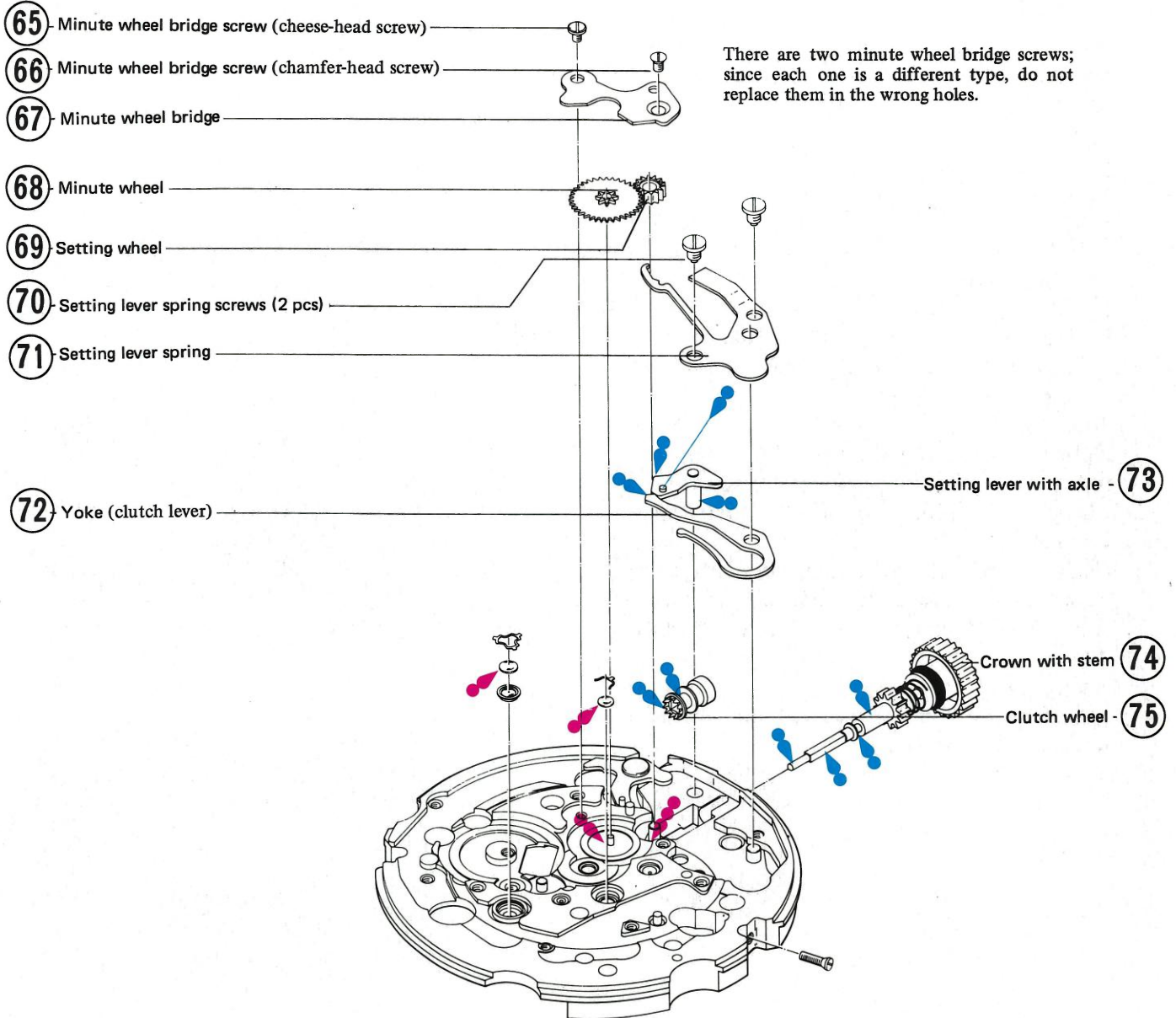
Lubricating the fourth wheel and pinion:
Set the center chronograph wheel on the staking tool as shown in the diagram; then lubricate the fourth wheel and pinion while depressing the wheel with a pair of tweezers.



(Fig. 11)



6139A Setting Mechanism



6139A Checking and Adjusting the Chronograph Mechanism-1

I. Checking and adjusting the coupling levers

- When the up and down interlocking condition between the coupling levers and clutch ring is incorrect, it will cause various troubles such as damage to clutch spring (when interlocked deeper), halting, or free run (when interlocked shallower). Remedy by effecting the following procedures.

Checking:

- Confirm that the coupling lever's Point B comes to a lower level than the clutch ring's Point A when kept at "run" and the bridge side is turned up.
- Raise the fourth wheel and pinion while in a stopped condition, confirming that the clutch ring and fourth wheel are completely separated. (Fig. 13)

Adjusting:

Adjust vertical positioning of the upper and lower hole jewel of center chronograph wheel.

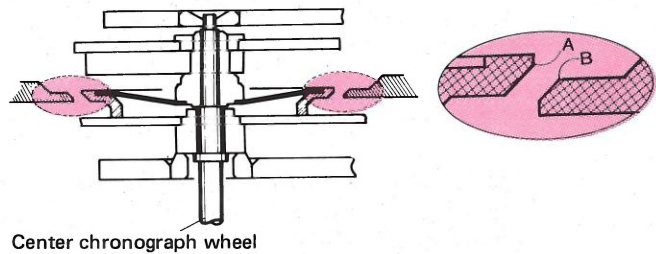
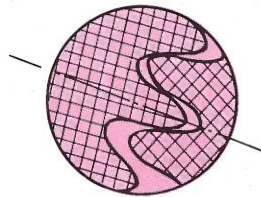
- Clearance of coupling levers and clutch ring.

Checking:

Clearance between clutch ring and first coupling lever and clearance between clutch ring and second coupling lever must be identical (Fig. 14).

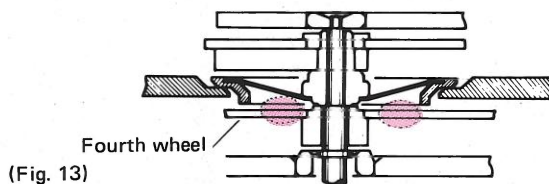
Adjusting:

Adjust by turning the eccentric pin (*) of the second coupling lever.



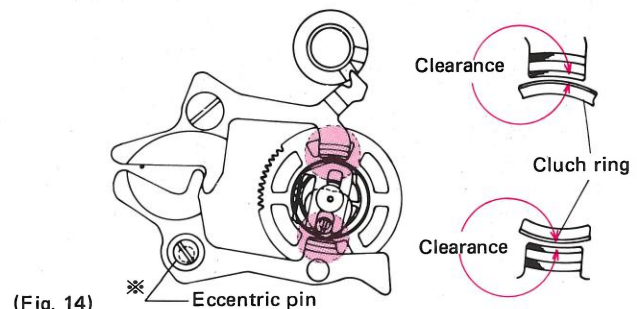
Center chronograph wheel

(Fig. 12)

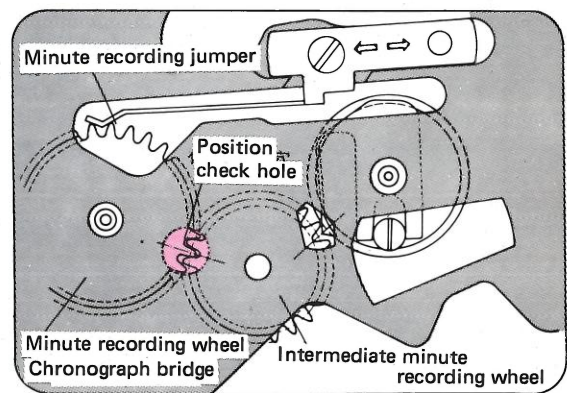


Fourth wheel

(Fig. 13)



(Fig. 14)



(Fig. 15)

II. Checking and adjusting minute recording jumper

- Correct positioning of minute recording jumper
Confirm that the three teeth of minute recording wheel can be observed symmetrically in the position check hole. (Fig. 15)

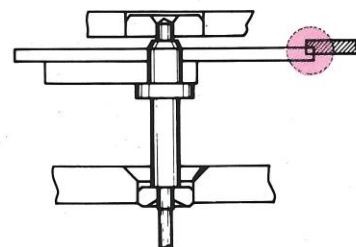
Adjusting:

Loosen the screw, and adjust the minute recording jumper by moving it to the right and left.

- Height of the minute recording jumper

Checking:

- Elevation of the minute recording jumper from the upper level of minute recording wheel must be less than half the thickness of the minute recording jumper. (Fig. 16)



(Fig. 16)

6139A Checking and Adjusting the Chronograph Mechanism-2

- (2) By turning the minute recording wheel, confirm that the lower surface of the minute recording jumper does not contact top of the screw of first coupling lever. (Fig. 17)

Adjusting:

Bend the root of minute recording jumper either up or down. (Fig. 18)

3. Force of minute recording jumper

Insufficient force of minute recording jumper pressing against minute recording wheel results in retarding advance of the chronograph minute hand at forwarding time in minutes. If the force is too strong, it causes the chronograph minute hand to stop. Pay close attention to this.

Checking:

Check force of the minute recording jumper by strength of the mainspring.

- (1) After completely releasing the mainspring, start it by winding the ratchet wheel just halfway, confirming that the chronograph finger adequately activates the minute recording wheel.
- (2) Confirm that the minute recording jumper precisely regulates advance of the minute recording wheel. (Fig. 19)

Adjusting:

Bend the base of the minute recording jumper in either direction as indicated by arrows. (Fig. 20)

III. Adjusting the chronograph finger

1. Locking contact of chronograph finger

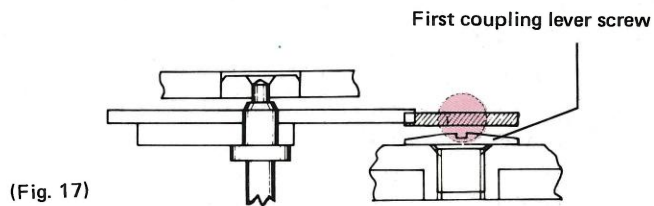
Checking:

After correctly adjusting the position of minute recording jumper (refer to Adjust II-1), rotate the chronograph finger forward in a stopped condition, checking the degree with which the chronograph finger contacts the intermediate minute recording wheel.

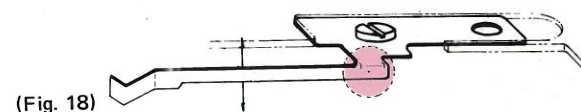
- (1) The amount of such contact should be more than $1/4$ but less than $1/2$ the size of the flat end of the chronograph finger. (Fig. 21-A).
- (2) The chronograph finger should not touch other teeth on both sides of the tooth contacting the intermediate chronograph wheel.

Adjusting:

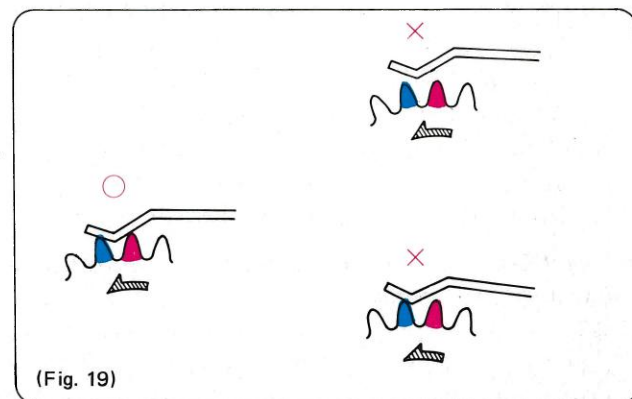
First straighten out the chronograph finger spring (the oblique lined stem in Fig. 22); then bend the basic portion (encircled) to effect desirable contact.



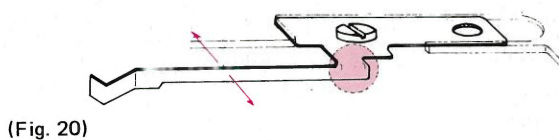
(Fig. 17)



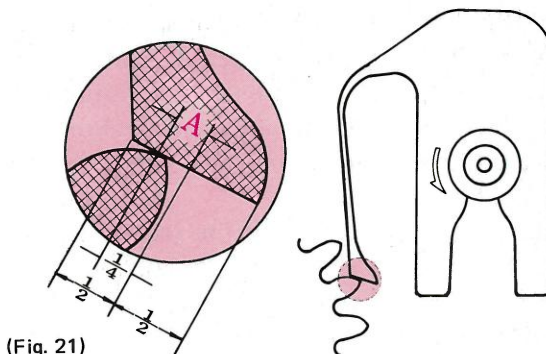
(Fig. 18)



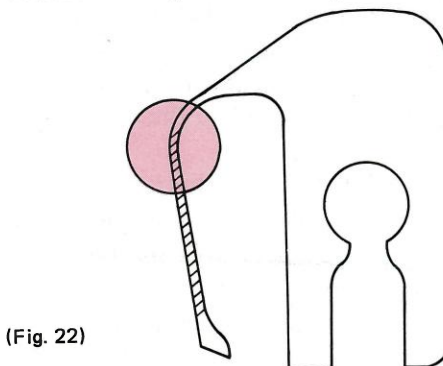
(Fig. 19)



(Fig. 20)



(Fig. 21)



(Fig. 22)

6139A Checking and Adjusting the Chronograph Mechanism-3

2. Position of the chronograph finger

If the position of the chronograph finger rotating direction is abnormal, forwarding time of the chronograph minute hand becomes defective around the "0" second.

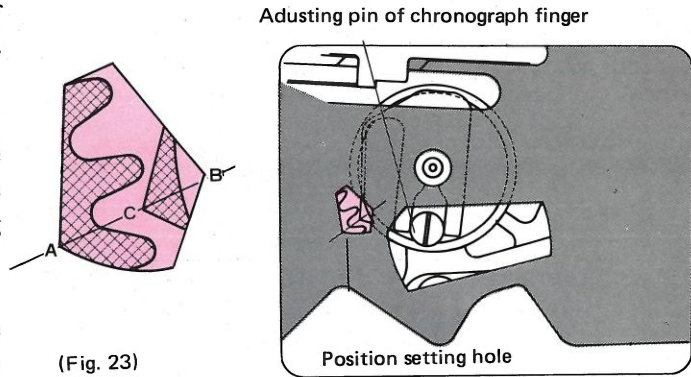
Checking:

After resetting the hands, point C of the chronograph finger must be straight on line between points A and B of the position setting hole. (Fig. 23)

Adjusting:

While keeping the hammer depressed, turn the adjusting pin of chronograph finger attached to the second heart, until the correct position for point C is obtained.

(Note) Be careful to avoid breaking the pivot of center chronograph wheel which sometimes occurs if the pin is pressed too strongly.



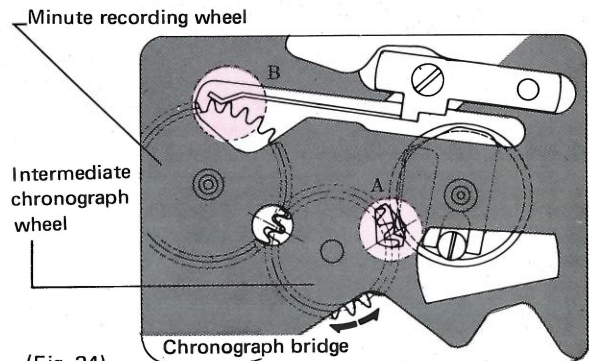
(Fig. 23)

IV. Checking and adjusting contacting condition of the hammer and hearts

When the hands are reset, there should be no clearance between the setting surface of the hammer and the second heart. Suitable clearance between setting surface of the hammer and the minute heart is 0.02mm. Should the clearance be excessive, the hands will not be reset to the "0" second.

Checking:

Actually, it is difficult to observe clearances between the hearts and the hammer, so clearances should be judged by the degree of shake observed when the intermediate minute recording wheel, minute recording wheel, and center chronograph wheel are reset to their original position. (Fig. 24)



(Fig. 24)

1. Adjust clearance between the second heart and the hammer to zero. In a condition that the hammer is depressed (i.e. in a condition that the hearts and the hammer are contacted), no shakes should occur when slightly moving the center chronograph wheel to the right and left.
2. Check clearance of the minute heart by rotating the minute recording wheel to the right and left. (Table 1)

- A. Keep the hammer continuously depressed. Teeth of the intermediate minute recording wheel should not pass over the crest of the chronograph finger.
- B. Similarly, teeth of the minute recording wheel should not pass over the crest of the minute recording jumper.

	Intermediate minute recording wheel: A		Minute recording wheel: B	
Free condition				
When turning A to the right				
When turning A to the left				
Adjustment	—	Polish second setting surface of the hammer	—	Polish second setting surface of the hammer

Table 1

6139A Checking and Adjusting the Chronograph Mechanism-4

Adjusting:

When shakes exist in the second heart:

Polish setting surface of the hammer contacting the minute heart.

When shake of the minute heart is excessive (when passing over the crest):

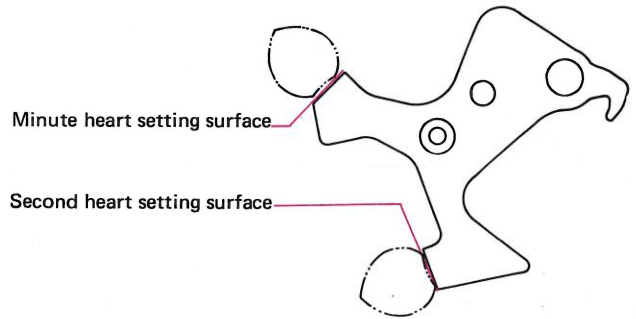
Polish setting surface of the hammer contacting the second heart.

(Note) When polishing the hammer, slightly file the point parallel to the setting surface, finishing to a mirrored surface. (Fig. 25)

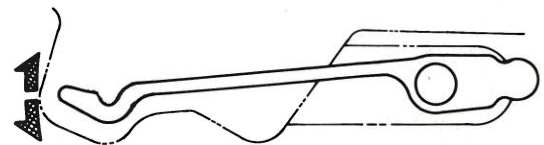
V. Adjusting pressing strength of the second button (fly-back button)

After installing the movement and the buttons on the case, check pressing strength of the second button.

Adjust pressing strength to the same as that of the first button. When the pressing strength is too strong, it will damage the chronograph mechanism.



(Fig. 25)



(Fig. 26)

Adjusting:

Bend tip of the hammer click by holding the pit portion. Do this carefully; the parts are apt to be damaged when it is bent too much.

Repairing the Chronograph Mechanism

I. Repairing Method

1. Center chronograph wheel—Damage due to:

- (1) Broken clutch spring
- (2) Strength of clutch spring too weak
- ∨ In these cases, the chronograph second hand either fails to move or moves irregularly.
- (3) Broken chronograph finger

Broken chronograph finger does not advance the chronograph minute hand.

If (1), (2) or (3) occur, replace the center chronograph wheel, referring to Checking and Adjusting the Coupling Levers mentioned in item I, Adjusting the Chronograph Finger mentioned in III, and Checking and Adjusting the Contacting Condition of the Hammer and the Hearts mentioned in IV of Chronograph Adjustment.

2. Loose chronograph second hand

If the chronograph second wheel does not reset to the "0" position when depressing the button, confirm the following point.

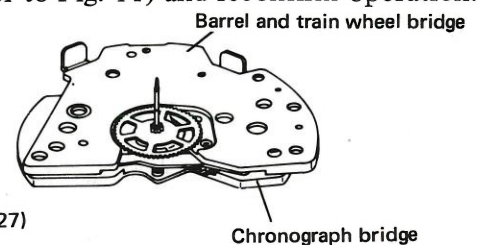
Check if the second hand moves when the second button is pressed. If it moves, the cause is due to loose contact of the second hand and center chronograph wheel axle. To correct this, reinsert the second hand to the extent that does not cause second hand catching.

3. Poor revolving efficiency of the fourth wheel

If the gear-train is not functioning well in a stopped condition, repair the watch after confirming the following points:

- (1) Check for correct shakes
- (2) Check for friction between each wheel
- (3) Check for correct revolving condition of the fourth wheel

As to confirming item (3), first install the chronograph bridge in a condition that the coupling levers are secured to the barrel and train wheel bridge. Next, as shown in Fig. 27, set the fourth wheel in a starting condition with the bosom side of the barrel and train wheel bridge built in the chronograph bridge upward. Next, after confirming clearance between the fourth wheel and clutch ring in a stopped condition, turn the fourth wheel and pinion with a soft brush to check whether or not it turns smoothly. If revolution is defective, clean and lubricate it (refer to Fig. 11) and reconfirm operation.



(Fig. 27)



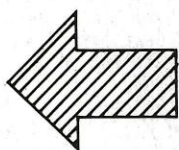
6139A After-Sales Service-Trouble-Shooting

The chronograph mechanism is very precisely constructed. When repair is requested, it is important to listen to the customer describe the watch condition. Further, it proves especially valuable in ensuring correct repair to classify the

cause according to the following table, based on details described by the customer. Listing malfunctions in the chronograph mechanism, their causes, and corrective actions, this table can be used effectively.

Mechanisms	Phenomena	Causes	Corrective action	
Starting stopping mechanism	First and/or second buttons do not move	Button gasket worn out		
		Dust adhered around button axle		
		Lack of silicon grease		
	Mechanism does not start even when depressing button	Deeper than necessary interlocking of chronograph finger	Refer to Chronograph Adjusting III-1	
		Damaged center chronograph wheel	Refer to Chronograph Repairing I	
		Unsmooth operation of first and second coupling levers		
	Defective forwarding time of chronograph minute hand	Hands catching		
		Defective position of minute forwarding	Refer to Chronograph Adjusting III-2	
	Chronograph minute hand only moves in middle of graduation	Loosened chronograph second hand	Refer to Chronograph Repairing I	
		Shallow interlocking of chronograph finger	Refer to Chronograph Adjusting III-1	
	Chronograph minute hand stops in forwarding condition	Weak minute recording jumper	Refer to Chronograph Adjusting II-3	
		Detached minute recording jumper	Refer to Chronograph Adjusting II-2	
		Malfunction of intermediate minute recording wheel turning		
		Chronograph minute hand catching		
	Chronograph minute hand not being forwarded	Deep interlocking of chronograph fingers	Refer to Chronograph Adjusting III-1	
Strong minute recording jumper		Refer to Chronograph Adjusting II-3		
Chronograph minute hand forwarded simultaneously with starting	Detached minute recording jumper	Refer to Chronograph Adjusting II-2		
	Insufficient amplitude			
Hands do not stop even when depressing first button to stop position	Malfunction of intermediate minute recording wheel turning			
	Damaged center chronograph wheel	Refer to Chronograph Repairing I		
Resetting mechanism	Defective pressing condition of buttons	Shallow interlocking of chronograph wheel	Refer to Chronograph Adjusting III-1	
		Defective chronograph finger position	Refer to Chronograph Adjusting III-2	
	Second hand does not reset to the "0" position	Damaged center chronograph wheel	Refer to Chronograph Repairing I	
		Clutch spring raises only slightly	Refer to Chronograph Adjusting I-1	
		Abrased button gasket		
	Chronograph minute hand does not reset to the "0" position	Lack of silicon grease		
		Weak hammer click	Refer to Chronograph Adjusting V	
		Lack of oil on fly-back lever pin		
		Deep interlocking of chronograph finger	Refer to Chronograph Adjusting III-1	
	Hands do not reset even when depressing the second button	Loosened chronograph second hand	Refer to Chronograph Repairing I	
		Abrased hammer	Refer to Chronograph Adjusting IV	
	Defective durability	No durability in starting condition	Deep interlocking of chronograph finger	Refer to Chronograph Adjusting III-1
			Weak minute recording jumper	Refer to Chronograph Adjusting II-3
			Detached minute recording jumper	Refer to Chronograph Adjusting II-2
		No durability in stopping condition	Excessive shakes of minute hand and hammer	Refer to Chronograph Adjusting VI
Friction of fourth wheel				
Defective rotating condition of fourth wheel			Refer to Chronograph Repairing I	

6139A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING PROCEDURES



Regarding repairing and adjusting of Cal. 6139A, we have already mentioned them in the SEIKO TECHNICAL GUIDE. However, on these pages, items to be checked on watch stopping, and repairing and adjusting for each item, are compactly arranged to facilitate further comprehension.

EXPLANATIONS REGARDING WATCH STOPPING AT 58 SECOND POSITION

- **A watch stopping at 58 second position is not malfunctional.**

When the mainspring winding is insufficient the second hand always stops at the 58 second position.

But this is not a malfunction.

- **The reason why a watch stops at 58 second position:**

In the 6139A, when the second hand moves from 58 to 60 second, the mechanism is devised so that the chronograph minute hand moves one graduation. At the 58 second position where the chronograph minute hand moves, a larger mainspring force is required.

Consequently, when the mainspring is nearly unwound, 6139A always stops at the 58 second position.

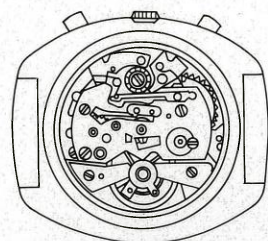
- **A watch in the following condition is defective.**

When the second hand stops at the 58 second position in spite of a fully wound mainspring, the watch is defective. Repair and adjust it according to the following procedures.

1. **Items to be checked before beginning repair works.**
 - * Checking the number of remaining windings of the mainspring
2. **When the balance stops at the 58 second position.**
3. **When the second hand stops at the 58 second position and the balance is still moving.**

6139A CHECKING ON WATCH STOPPING, AND REPAIRING AND ADJUSTING PROCEDURES

(Example of stopping at 58 second position)



1 Confirm the Following Items Before Beginning Repair Work

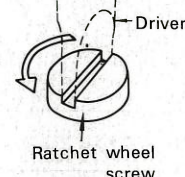
- A. Check *the number of remaining windings of the mainspring of the watch, of which the second hand stops at the 58 second position as shown in the above diagram.
- B. In this case, when the number of remaining windings of the mainspring is.....
 - More than 1 - 1.5 windings.....Adopt Procedure 2
 - Under 1 winding..... Adopt Procedure 3

*Checking the number of remaining windings of the mainspring

1. Remove the automatic winding section (oscillating weight section).
2. Firmly hold the ratchet wheel screw with a driver and release the click by using a pair of tweezers.
3. In this condition, gradually turn the ratchet wheel screw counterclockwise until the mainspring power is exhausted (releasing the mainspring).
4. This revolving number of the ratchet wheel screw corresponds with the number of remaining windings of the mainspring.

(Note)

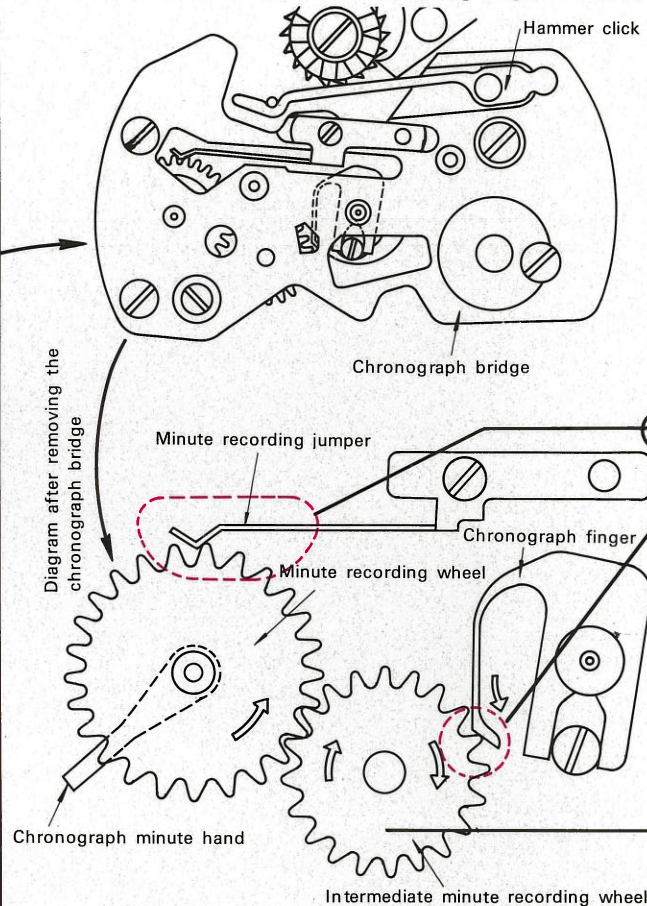
It is convenient to count the number of remaining windings of the mainspring by confirming the direction of the groove of the ratchet wheel screw.



[When the number of remaining windings of the mainspring exceeds 1 - 1.5 windings]

2 When the Balance stops at the 58 second Position

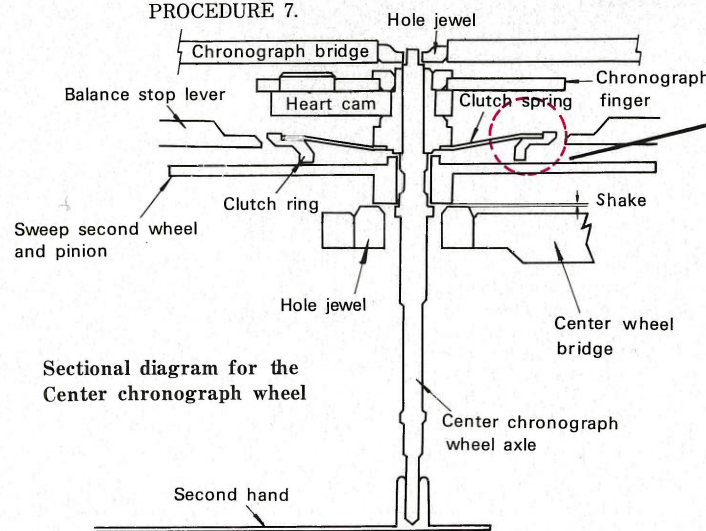
In this case, inspect the watch according to CHECKING PROCEDURES 4 through 6 after removing the case back and the automatic winding section (oscillating weight section).



[When the number of remaining windings of the mainspring is under 1 winding]

3 When the Second Hand stops at the 58 second Position and the Balance is Still Moving

In this case, inspect the watch according to CHECKING PROCEDURE 7.

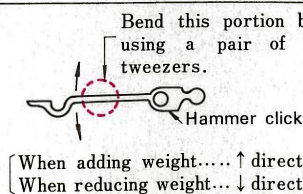


Checking procedure	Checking details	Repairing and checking methods									
4	<p>Check the condition when the chronograph finger contacts the intermediate minute recording wheel (when the minute forwarding is ready to start).</p>	<p>In case of X Adjust the amount which the chronograph finger contacts with the wheel by bending this portion in the → or ← direction, holding it with a pair of tweezers.</p> <p>The amount of such contact (ℓ) should be more than 1/4 but less than 1/2 the size of L.</p>									
5	<p>Check whether or not teeth of the minute recording wheel are forwarded by winding the ratchet wheel only half a revolution after completely releasing the mainspring.</p> <table border="1"> <thead> <tr> <th>At 58 - 59 second</th> <th>At 60 second</th> <th>Judgment</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>○</td> </tr> <tr> <td></td> <td>(Stopping)</td> <td>×</td> </tr> </tbody> </table> <p>Cannot be forwarded because the spring of the minute recording jumper is too strong</p>	At 58 - 59 second	At 60 second	Judgment			○		(Stopping)	×	<p>In case of X, create a forwarding condition by winding the ratchet wheel only half a revolution after completely releasing the mainspring. To satisfy both following ① and ②, adjust strength of the minute recording jumper spring.</p> <ol style="list-style-type: none"> ① Minute forwarding is correctly performed between 58 and 60 second position. ② After performing minute forwarding, chronograph finger always must be geared correctly into the wheel. <p>Adjust strength of the minute recording jumper spring by bending this portion in the ↑ or ↓ direction.</p> <p>(Note) When the minute is not forwarded in spite of weakening the strength of minute recording jumper, first check and correct the watch according to Procedure 6; then adjust strength of the minute recording jumper.</p>
At 58 - 59 second	At 60 second	Judgment									
		○									
	(Stopping)	×									
6	<p>Remove the chronograph bridge and check on revolving condition of the intermediate minute recording wheel.</p> <p>Lightly turn the intermediate minute recording wheel with a soft small brush.</p> <p>Turns lightly ○ Turns heavily ×</p>	<p>When the intermediate minute recording wheel turns heavily (×), wash the chronograph bridge with an ultrasonic cleaner.</p> <p>(Note) Never lubricate the intermediate minute recording wheel.</p>									
7	<p>[When the second hand stops at the 58 second position and the balance is still moving, the cause is due to slipping of the clutch ring.]</p> <p>(Note) If the shake of the center chronograph wheel is excessive, the second hand moves intermittently in spite of stopping condition. Adjust the shake properly (the shake is proper when it is almost the same as ordinary wheel's).</p>	<p>Remove the center chronograph wheel and sufficiently wash it; then lubricate between the fourth wheel and the center chronograph wheel axle with Moebius Synt-A-Lube. Confirm the moving condition of the clutch. When the clutch is loosened, replace the center chronograph wheel with a new one. In this case, properly adjust shake of the new center chronograph wheel.</p> <p>Adjust the shake by raising or lowering this hole jewel. (Adjust it on a staking tool or a riveting-stake).</p>									

General Checking Procedures After Repairing

1. Pushing strength of the hammer button

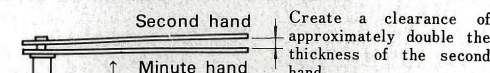
When pushing strength of the hammer button is too heavy, the second hand is reset too fast, causing a defective resetting position. consequently adjust it lightly as far as possible.



When adding weight..... ↑ direction
When reducing weight... ↓ direction

2. Clearance between hands

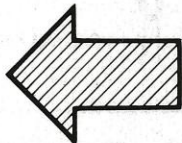
When the clearance between the second hand and the minute hand is too narrow, sometimes the second hand scratches the minute hand when resetting. Always check the clearance between the hands.



Create a clearance of approximately double the thickness of the second hand

(Note) When installing the second hand, use the movement holder (S-500) for 6139A.

Checking, Repairing and Adjusting Methods for Slipping of Chronograph Second Hand at the Fly-Back Position of Cal. 6138A and 6139A



Checking, repairing, and adjusting methods of watch stopping at 58 second position of Cal. 6139 have been explained in detail in 6139A-14. On these pages, only slipping of chronograph second hand at the fly-back position is described.

When you are requested to repair slipping of the fly-back position, please refer to the following procedures.

Explanations in these pages can be utilized in common to both 6138A and 6139A.

- **Check Points Before Starting Repair**

- **When Chronograph Second Hand does not Return to "0" Position**

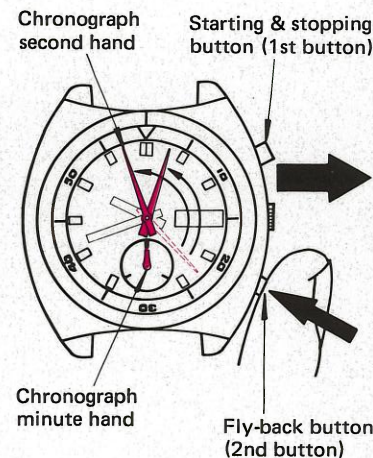
- **When Both Chronograph Second Hand and Minute Hand do not Correctly Return**

- **Overall Check Points after Repair**

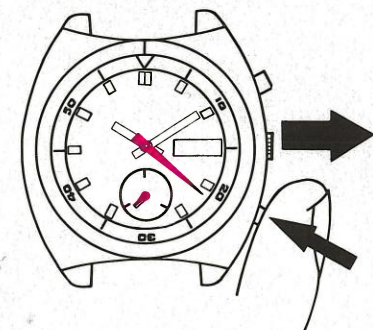
Checking, Repairing and Adjusting Methods for Slipping of Chronograph Second Hand at the Fly-Back Position of Cal. 6138A and 6139A

If the chronograph second hand does not return to the "0" position when pushing the fly-back button (2nd button), confirm that the condition is Case 1 or Case 2, before repairing.

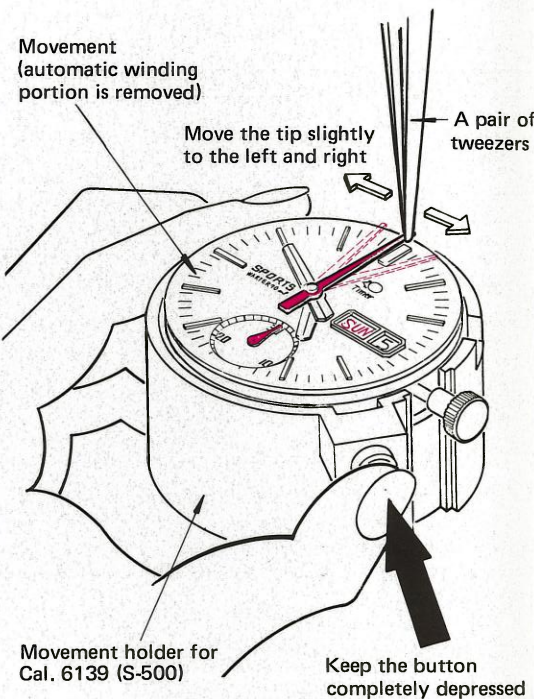
1 When the Chronograph Second Hand Does Not Return to "0" Position



2 When both Chronograph Second Hand and Minute Hand Do Not Correctly Return

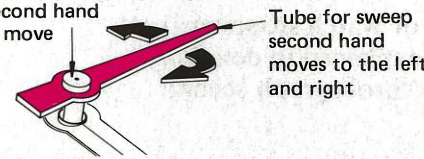


Hold the tip of the chronograph second hand with a pair of tweezers and move it slightly to the left and right while keeping the fly-back button completely depressed.

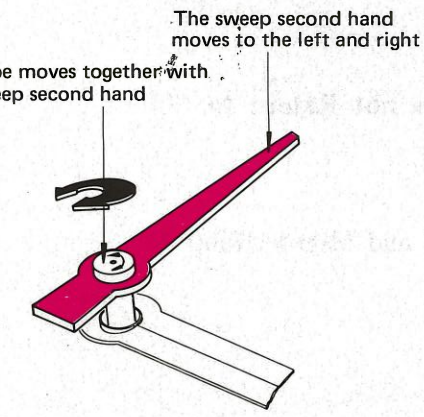


Check Poits

1. When only the sweep second hand moves while the tube for sweep second hand does not move.
Sweep second hand does not move. Tube for sweep second hand moves to the left and right.

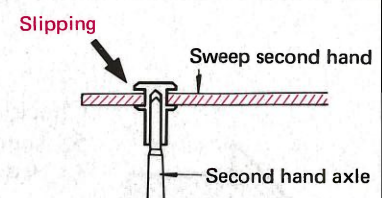


2. When the sweep second hand and the tube for sweep second hand move together.
The tube moves together with the sweep second hand. The sweep second hand moves to the left and right.

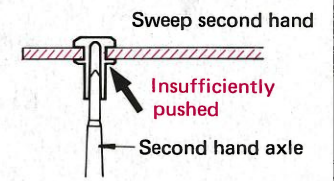


Repairing and Adjusting Methods

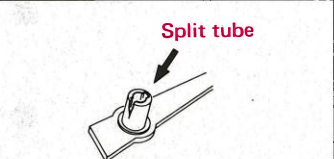
This is caused by a slip between the sweep second hand and the tube for sweep second hand as shown in the diagram on the right.
In this case, replace it with a new chronograph second hand.



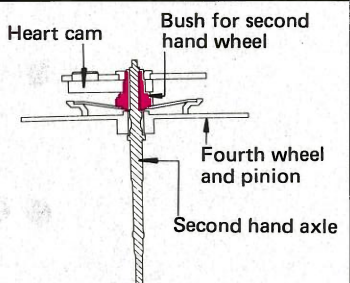
*(a) Insufficient installation of the second hand may cause this malfunction. First, completely push the second hand, and then recheck the fly-back position of second hand.
If this method is not effective, make a check (b).



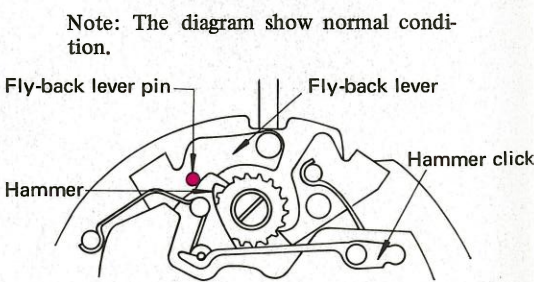
(b) Detach the second hand and check the tube for sweep second hand.
* If the tube hole is enlarged too much or split as shown in the diagram on the right, replace it with a new sweep second hand.



(c) If the above-mentioned methods (a) and (b) are not effective, it may be caused by a slip between the bush for second hand wheel of the center chronograph wheel (in red color) and the second hand axle (oblique lines portion).
In this case, replace it with a new center chronograph wheel. At the same time, adjust the chronograph finger.
Note: For details, refer to 6139A-9



Remove the automatic winding section and check the position of a fly-back lever pin.

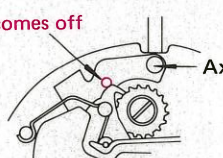


1. When the fly-back lever pin is hidden under the hammer.
Pin hidden.



Move the pin to the correct position by moving the fly-back lever in the arrow direction.

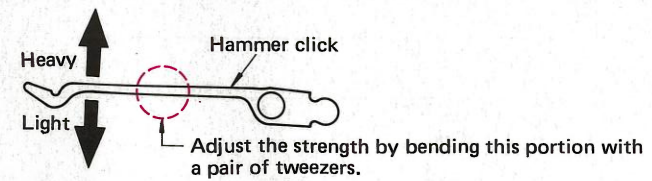
2. When the fly-back lever pin comes off.
Pin comes off.



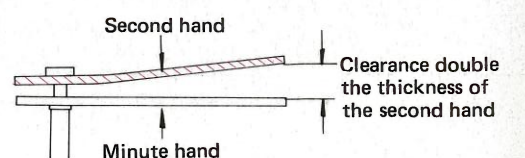
Replace it with a new fly-back lever. (Before replacing, remove the barrel and train wheel bridge, and pull out the axle.)

Overall Check Points After Repair

1. Pushing strength of the hammer button
Recommended pushing strength of the fly-back button is the same as that of the starting and stopping button.
If the strength is too heavy, the second hand is returned so quickly that the fly-back position may slip.



2. Clearance between second hand and minute hand
Create clearance double the thickness of the second hand between the second hand and the minute hand. After completely pushing in the second hand, adjust the clearance by bending the second hand upward.



(Reference) Installation Method of Chronograph Second, Minute, and Hour Hands

1. After removing the automatic winding section, set the movement on the movement holder (S-500) for Cal. 6139.
2. After setting the second hand (or chronograph minute and hour hands) at the "0" position, push it in lightly while keeping the fly-back button completely depressed. (Fig. 1)
3. After confirming the fly-back position of the second hand, completely push in the second hand.

Note: Since the tip of the center chronograph wheel is shaped as shown in Fig.2, the second hand will be loosened when it is moved to the right and left after completely setting it.

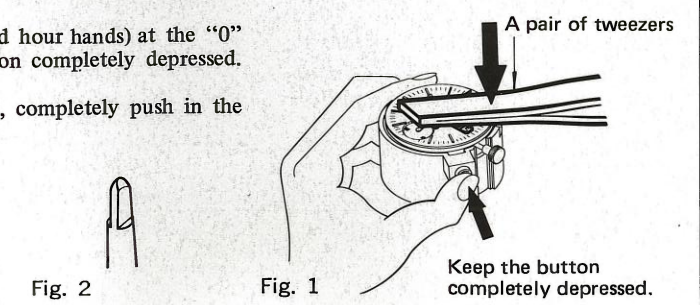


Fig. 2

Fig. 1

7005A

1) Specifications

Casing diameter	27.00 mm
Height	4.50 mm
Vibrations per hour	21,600
Automatic winding with sweep second	
Calendar	
Instant date setting device	

2) Features

This watch is rationally designed to an extremely high degree considering its simplicity in disassembling and assembling and its functional stability. As a result, parts involving screws, springs, and so forth are remarkably reduced.

Since disassembling and assembling operations are facilitated and the causes of malfunctions are reduced, handling becomes simple.

3) Disassembly and Assembly

Disassemble the watch according to the procedures shown in figures (1) to (45). Assemble the watch according to the procedures shown in figures (45) to (1).

4) Lubrication

Colored symbols printed in the figures show types of oil and lubrication points.

▶ Moebius Synt-A-Lube

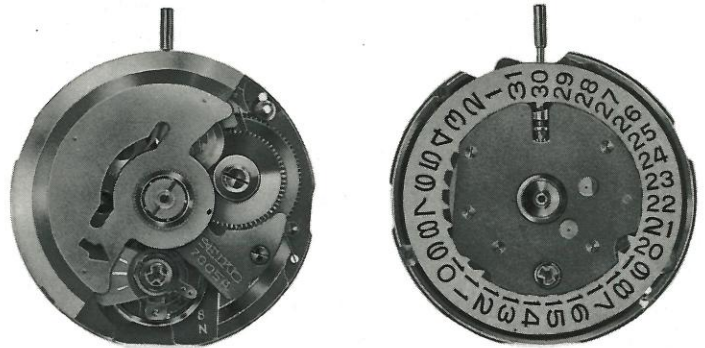
▶ Seiko watch oil S-4.

Points where oil other than the above is used are separately indicated, and should be lubricated correctly according to instructions.

NOTE) Portions with no indications do not require lubrication.

Oil quantity

- Extremely small quantity
- Normal quantity
- Sufficient quantity
- ⊗ Oil must not be applied



Enlarged movement

6) Transmission of Force in Automatic Winding Mechanism

Oscillating weight → First reduction wheel → Pawl lever → Second reduction wheel → Ratchet wheel → Mainspring. Since the hole of ratchet wheel and the upper portion of the barrel arbor form a "D" shape, reassemble them after combining their corners (Fig. 1).

7) Hands and Date Setting Mechanisms

Crown first position:

This is a free condition. (Fig. 2)

Second position:

Ratchet teeth of the clutch wheel mesh with teeth of the date dial, and in this position, date setting can be achieved instantly when the crown is turned counterclockwise. There is no range in which date setting cannot be performed. (Fig. 3)

Third position:

Since the clutch wheel meshes with the minute wheel, the hands can be reset to the correct time.

Since there is no setting wheel, hand setting is performed in a clockwise direction. (Fig. 4)

Eccentric dial pin

Eccentric dial pin system is adopted. When turning the slot clockwise with a screw driver, a slanted portion of the pin presses the dial feet and secures the dial. (Fig. 5)

When disassembling the dial, it is unnecessary to remove the eccentric dial pin from the plate.

Setting lever axle

As shown in the diagram, this is connected to the plate by spring action; therefore, it is unnecessary to remove it from the plate when disassembling and reassembling. When removing the winding stem, push the axle from the front side, holding a screw driver at a right angle to the main plate (Fig. 6)

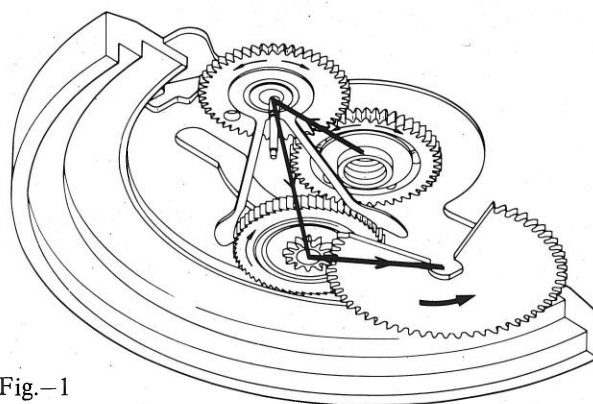


Fig.-1

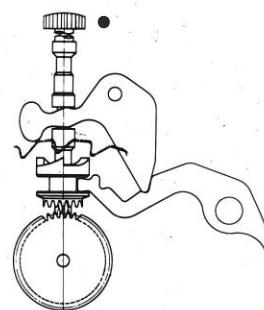


Fig.-2

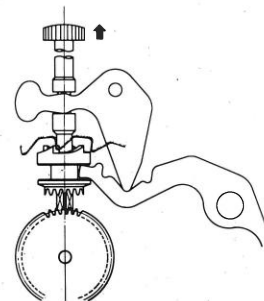


Fig.-3

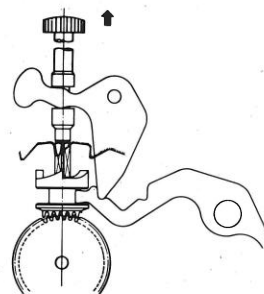


Fig.-4

Assembly Disassembly

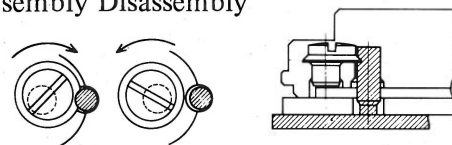


Fig.-5

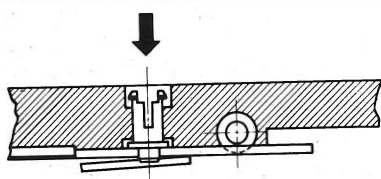


Fig.-6

7016A

1) Specifications

Casing diameter	27.00 mm
Height	6.40 mm
Vibrations per hour	21,600
Automatic winding	
Calendar (Day & date, bilingual changeover mechanism for day indication; crown winding date corrector; push-type day corrector mechanism)	
Chronograph (One revolution in 60 seconds, 30-minute totalizer, 12-hour totalizer, accumulated).	

2) Features

7016A Automatic Chronograph is a high-grade watch in which a chronograph mechanism and an automatic winding mechanism are compactly and thinly assembled in a variety of attractive designs. Its structure also is more simplified than the conventional chronographs, thus assuring greatly improved reliability and durability.

- * Equipped with chronograph hour and minute hands, automatic winding and day and date mechanism the watch enables recording lapsed time in seconds, minutes and hours.
- * It is the smallest and thinnest multifunction watch on the market.
- * It has the outstanding reliability and durability in its quality based on the past experiences.
- * It has a unique design in that chronograph hour and minute hands are attached to a single axle.
- * As the chronograph mechanism is designed to eliminate adjustments, it ensures easy assembly or disassembly of the watch.

3) Disassembly and assembly

Disassemble the watch according to Figures ① →

⑦①

Assemble by reversing the above: Figures ⑦① →

①

4) Lubrication

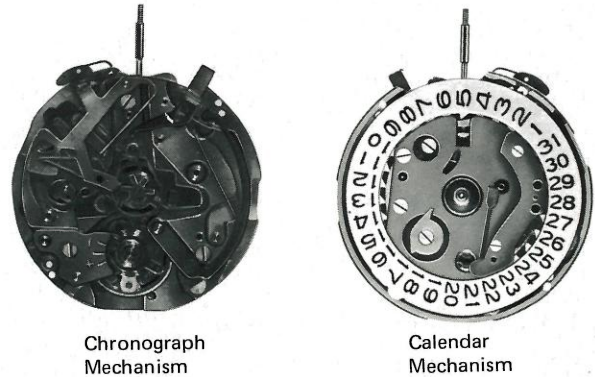
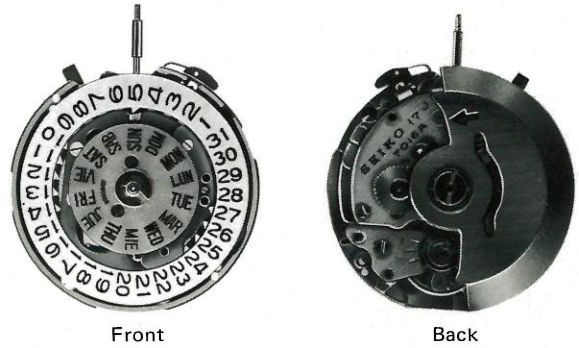
Shown below are the symbols used in sketch to indicate type of oil, degree of lubrication and lubricating points.

Types of Oil

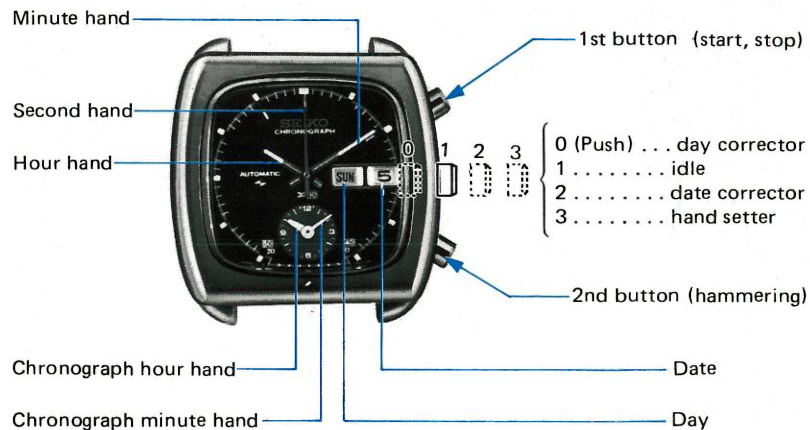
- SEIKO Watch Oil S-6
- SEIKO Watch Oil S-4
- SEIKO Watch Oil S-3
- Moebius Synt-A-Lube
- Moebius Synt-V-Lube

Oil quantity

- : Extremely small quantity
- : Normal quantity
- : Sufficient quantity



Movement



Handling

7016A Calendar Mechanism

Disassembly Precautions

Confirm that watch movement is running.

The watch must be disassembled after the 1st button is pushed to start the movement. The second chronograph wheel may be damaged upon detachment if the watch is disassembled without starting the movement.

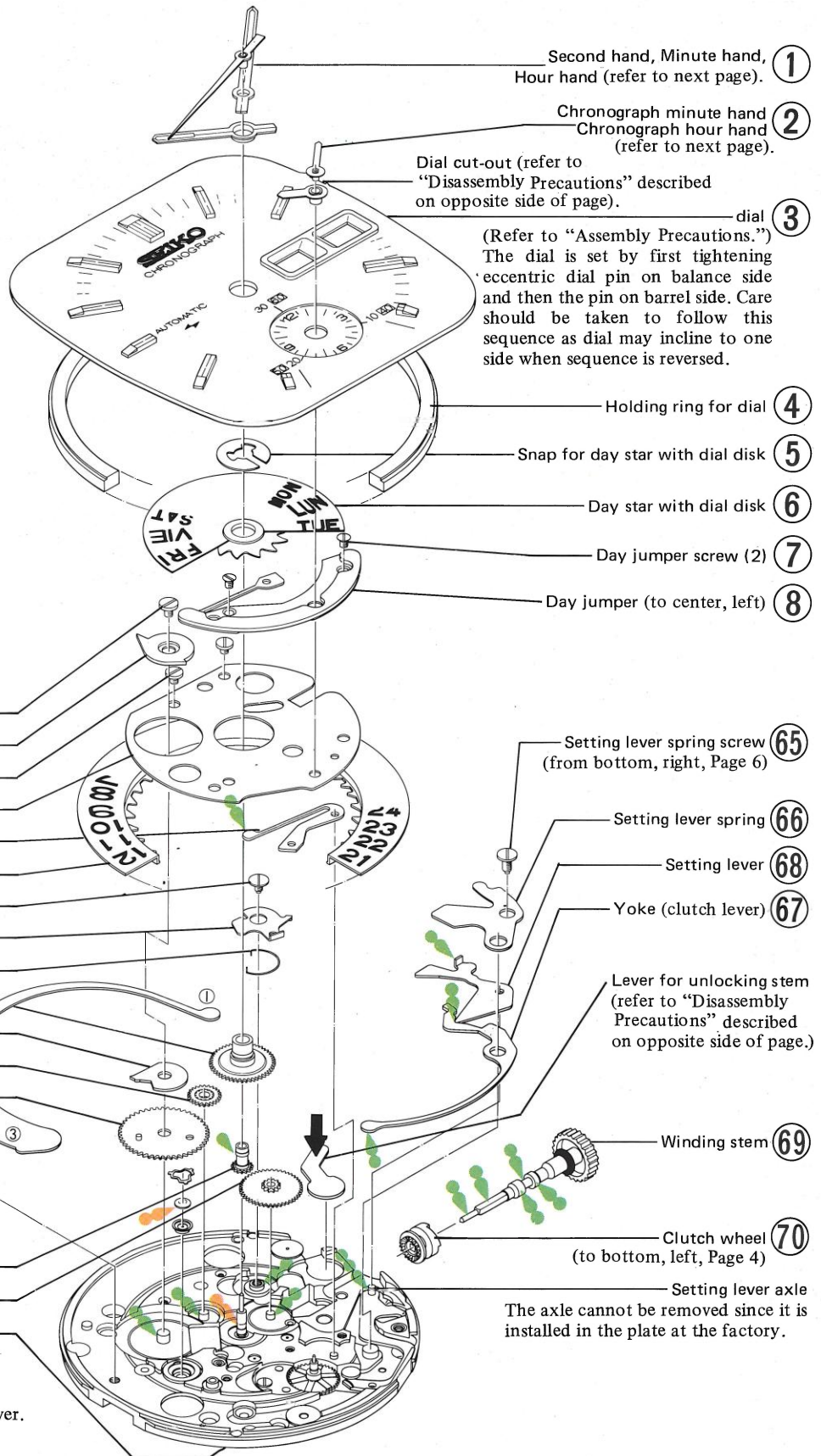
Detachment of Winding Stem.

(a) For square type water-resistant case or monolithic water-resistant case.

With stem at 1st or 2nd stage, pull winding stem while depressing setting lever located in case cut-out at 2 o'clock position.

(b) For back-cover casing

A part of setting lever is visible when winding stem is at the 3rd stage. Pull winding stem while depressing setting lever.



9 Date driving wheel screw

10 Day finger

11 Date dial guard screw

12 Date dial guard

13 Date jumper

14 Date dial

15 Day corrector screw

16 Day corrector

17 Day corrector spring (A)

18 Hour wheel

19 Date finger

20 Intermediate date wheel

21 Date driving wheel

22 Day corrector screw (B)

23 Day corrector spring (B)

Assembly sequence of day corrector spring is 1, 2, 3, (Refer to assembly precautions.)

25 Cannon pinion (to bottom, left, Page 4)

24 Minute wheel

Eccentric dial pin
The dial is attached or detached by turning eccentric dial pin 90° - 150°. When turning dial pin on barrel side, take care not to strike barrel with screwdriver.

1 Second hand, Minute hand, Hour hand (refer to next page).

2 Chronograph minute hand, Chronograph hour hand (refer to next page).

3 Dial cut-out (refer to "Disassembly Precautions" described on opposite side of page).
dial

(Refer to "Assembly Precautions.") The dial is set by first tightening eccentric dial pin on balance side and then the pin on barrel side. Care should be taken to follow this sequence as dial may incline to one side when sequence is reversed.

4 Holding ring for dial

5 Snap for day star with dial disk

6 Day star with dial disk

7 Day jumper screw (2)

8 Day jumper (to center, left)

65 Setting lever spring screw (from bottom, right, Page 6)

66 Setting lever spring

68 Setting lever

67 Yoke (clutch lever)

Lever for unlocking stem (refer to "Disassembly Precautions" described on opposite side of page.)

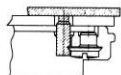
69 Winding stem

70 Clutch wheel (to bottom, left, Page 4)

Setting lever axle

The axle cannot be removed since it is installed in the plate at the factory.

(assembly) (disassembly)



Assembly and Disassembly Precautions

Detachment and Attachment of Hands

(a) Detachment

Use bow-type tweezers to avoid bending dial. Since the second-hand, chronograph minute-hand and hour-hand are attached firmly, it is necessary that they are removed individually by holding lower end of wheel pipe flange securely with tweezers.



(b) Attachment

The chronograph hands must be attached using the movement holder designed exclusively for Cal. 7016.

Warpage or slippage of the hands tend to occur when hands are attached without using the movement holder.



1. For attaching, first place movement on the movement holder. Be careful that neither oscillating weight or 1st reduction wheel strikes the thicker diameter pin.
2. Depress 1st button (operating lever) to stop movement; reset hands to zero while depressing 2nd button (hammer) and then depress hands gently into position.
3. Repeat hammering twice and check zero position of hands. When position is not correct, make corrections by turning hands with hammer in depressed position. After hammering, zero position of chronograph minute-hand is judged by releasing finger from button.
4. When zero position is correct, depress hands fully into position. Adequate attachment height of hands is attained by pushing hands to measurements described in sketch below.

5. Next, check zero position of chronograph minute and hour hands.

Chronograph hour-hand

With hammer in depressed position, determine whether hand returns to original position when it is lightly moved using tweezers to the left and right over the space of about 30 minutes (one digit to next digit).

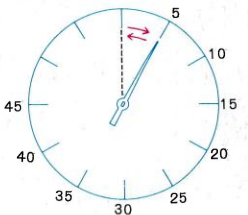
Chronograph minute-hand

With hammer in depressed position, move hand gently right and left over space of about 2 minutes (half of distance between two digits) and check if hand returns to original position.

(c) Exchange of Parts

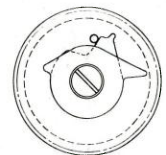
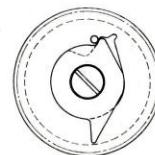
When hammer or second chronograph wheel are exchanged, check the operation of second heart.

1. Depress operating lever to stop watch movement.
2. Next, move second-hand on 5 seconds position using tweezers and depress hammer.
3. Repeat above hammering.
4. Repeat hammering twice each for 10, 15, 20, 25, 30, 40, and 45 seconds to move second heart smoothly.

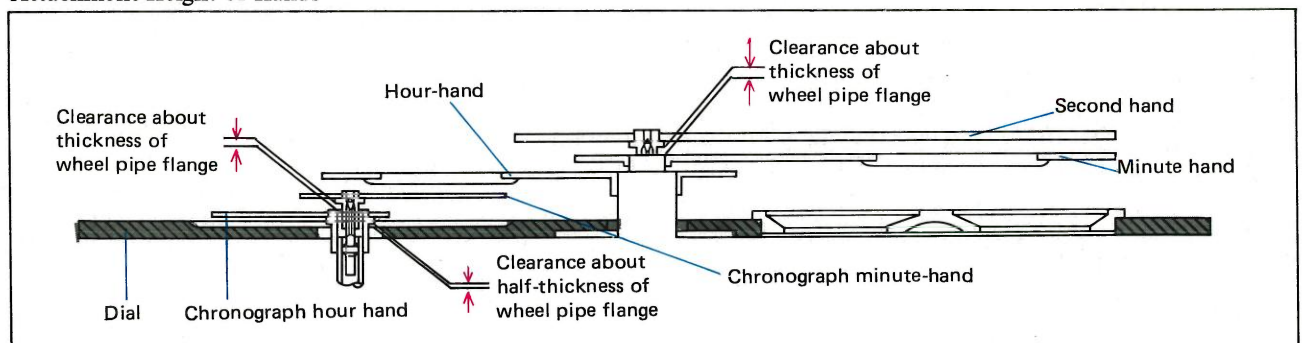


Attachment of Date and Day Fingers

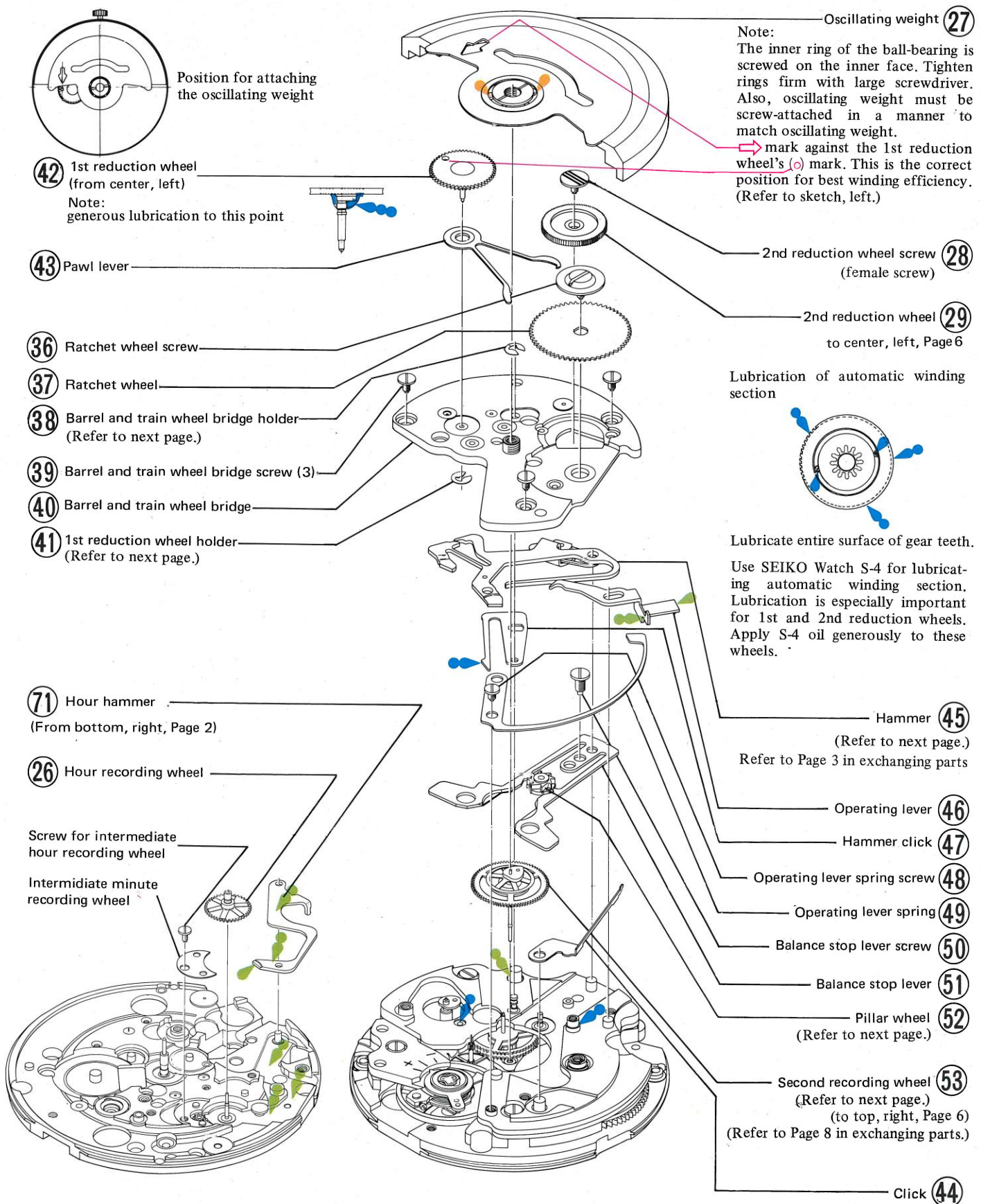
Be sure to attach date finger while day finger on the other hand is attached with due attention to position of tube for date driving wheel screw. Incorrect changeover of date and day will result when these procedures are not correctly followed.



Attachment Height of Hands



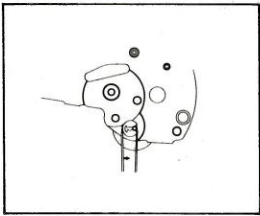
7016A Automatic Winding, Chronograph Mechanism



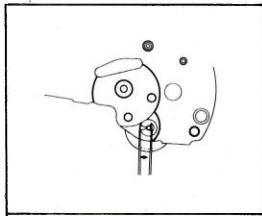
Assembly and Disassembly Precautions

Detachment and Attachment of 1st Reduction Wheel Holder and Barrel & Train-wheel Bridge Holder

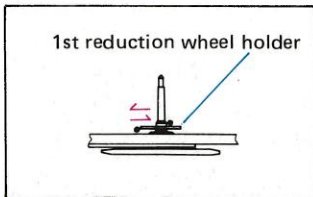
Insert tip of tweezer from the side in manner shown in sketch below. Be sure not to mistake front and back side of 1st reduction wheel in attaching 1st reduction wheel holder.



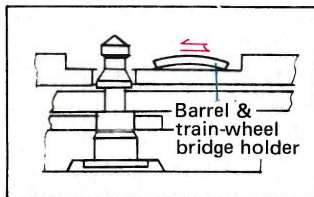
Detachment



Attachment



1st reduction wheel holder



Barrel & train-wheel bridge holder

Hammer

Detachment

Detachment must always start with hour hammer

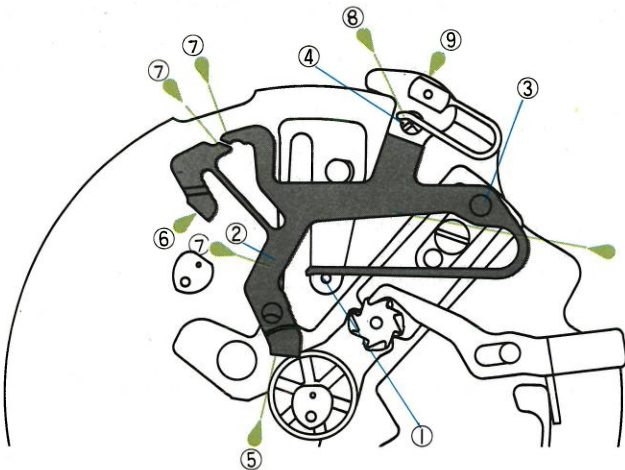
④ .

Attachment

Begin by bringing hammer spring ① into contact with pin, then hammer pin ② with hammer click. Place into hammer pin ③ and set up hour hammer ④ .

Position to Lubricate

- ⑤ second heart click surface
- ⑥ minute heart click surface
- ⑦ contact surface with barrel and train-wheel bridge
- ⑧ contact surface with hour hammer
- ⑨ contact surface with 2nd button



Balance Stop Lever, Pillar Wheel

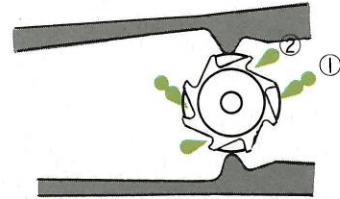
Detachment and Attachment

As the second recording wheel can be damaged by detaching balance stop lever in closed state (dead condition), it is essential that balance stop lever is detached in open state (during motion) with the pillar wheel linked.

Attach in same manner described above and following same precautions.

Position to Lubricate

- ① Four-pronged cam 2 portions
- ② Ratchet 2 portions



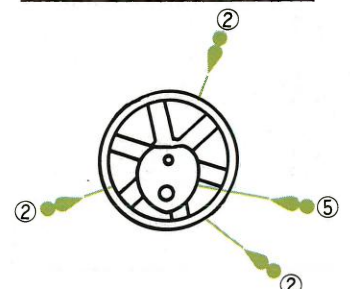
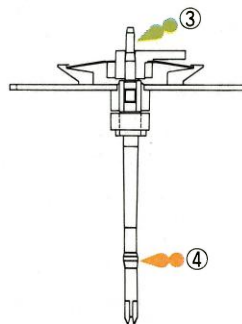
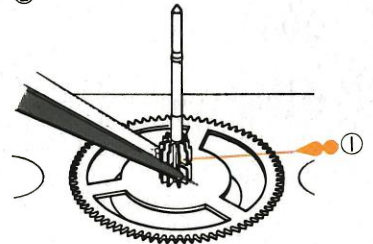
Lubrication of Second Chronograph Wheel

① 4th Wheel & Pinion

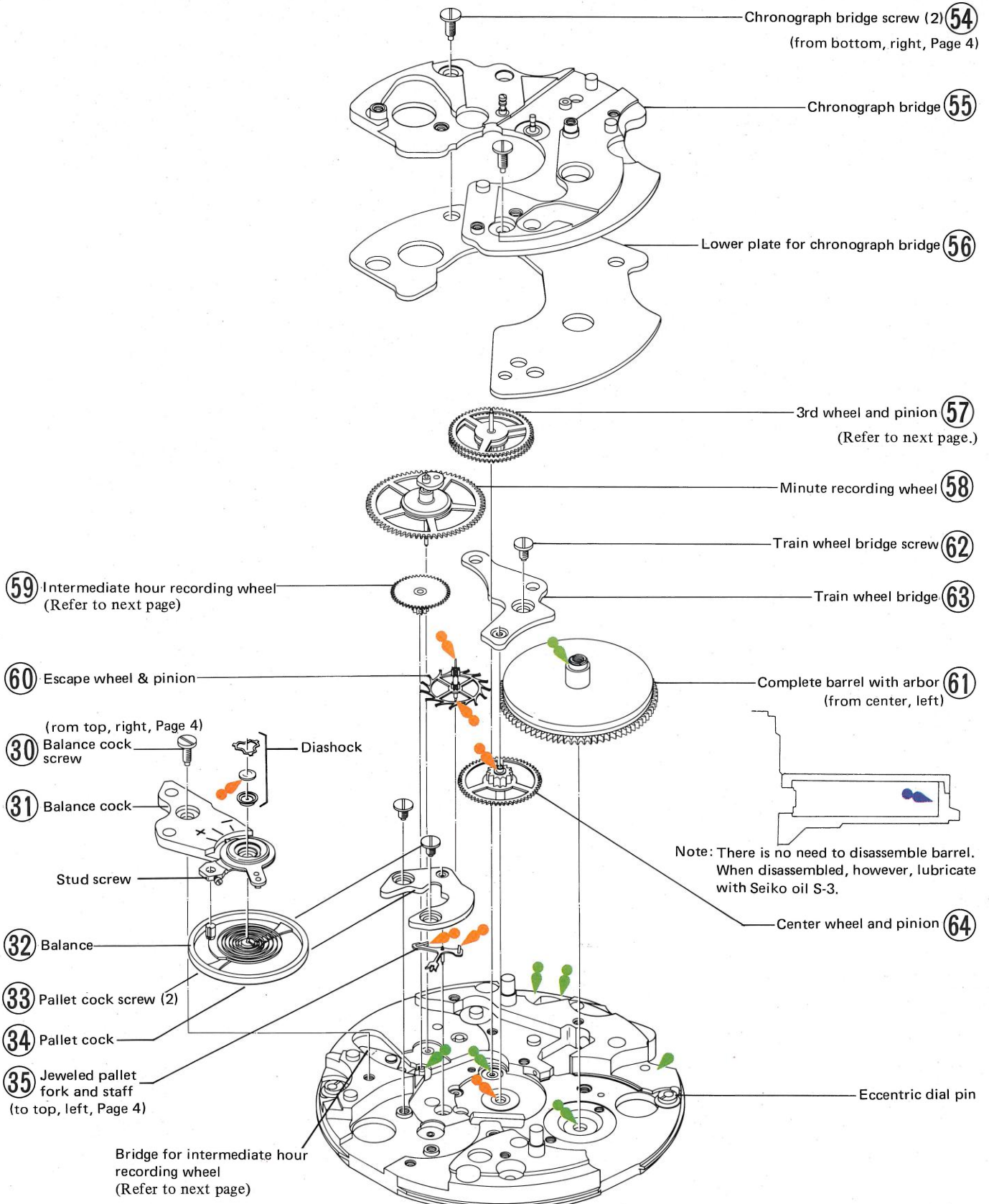
Place second chronograph wheel on staking stool as shown in sketch and lubricate 4th wheel & pinion while pressing it downward with tweezers. Excessive oil moving to pinion is eliminated by rinsing the second chronograph wheel with benzine and then dried.

Lubricate contact surface of clutch ring and spring . . . 3 portions ②

- ③ Upper stem
- ④ Center wheel Arbor
- ⑤ Half-circumference of heart



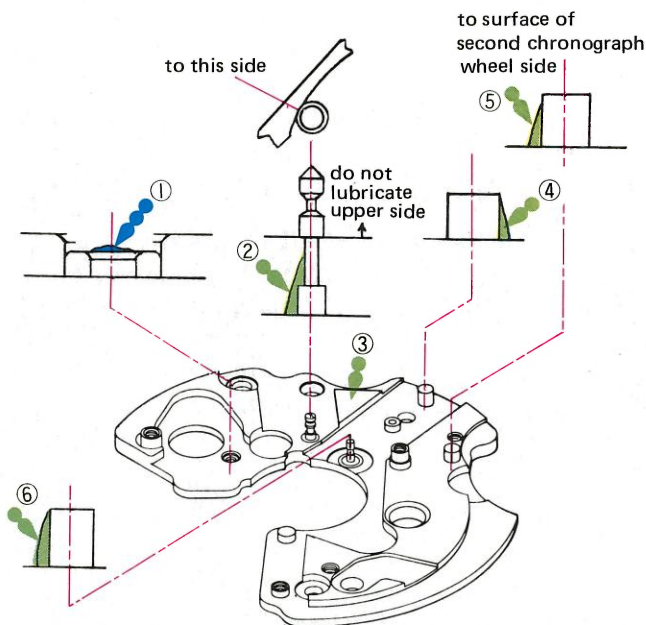
7016A Train wheel, Escapement and Regulating Mechanisms



Assembly and Disassembly Precautions

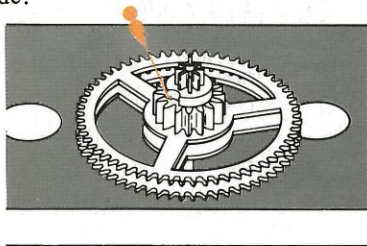
Lubrication of Chronograph Bridge

1. lower hole jewel for 1st reduction wheel
2. hammer spring screw
3. contact surface with hammer
4. hammer pin
5. operating lever pin
6. tube for pillar wheel screw



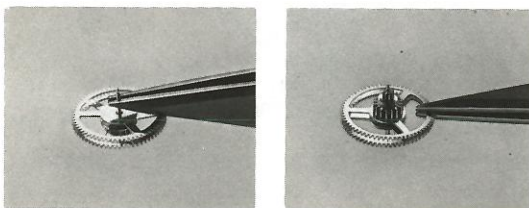
Lubrication of 3rd Wheel & Pinion

Place 3rd wheel and pinion on staking stool as shown in sketch and lubricate from lubrication-notch side.



Be careful in holding 3rd wheel and pinion. Pinch arbor or pinion gently.

As horizontal inclination may result, gear section should never be pinched when lubricating wheel.



O

X

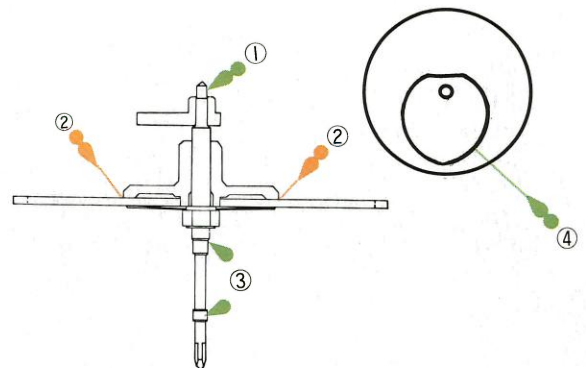
Minute Recording Wheel

Attachment

Be sure that minute hand tip faces balance cock. This is essential to ensure proper setting of chronograph bridge.

Position to Lubricate

1. upper stem
2. contact surfaces of minute wheel and minute wheel bush . . . 2 positions
3. minute-hand axle . . . 2 positions
4. half-circumference of heart



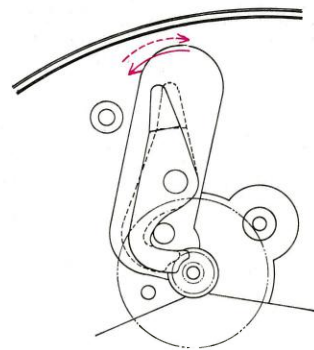
Detachment and Attachment of Intermediate Hour Recording Wheel

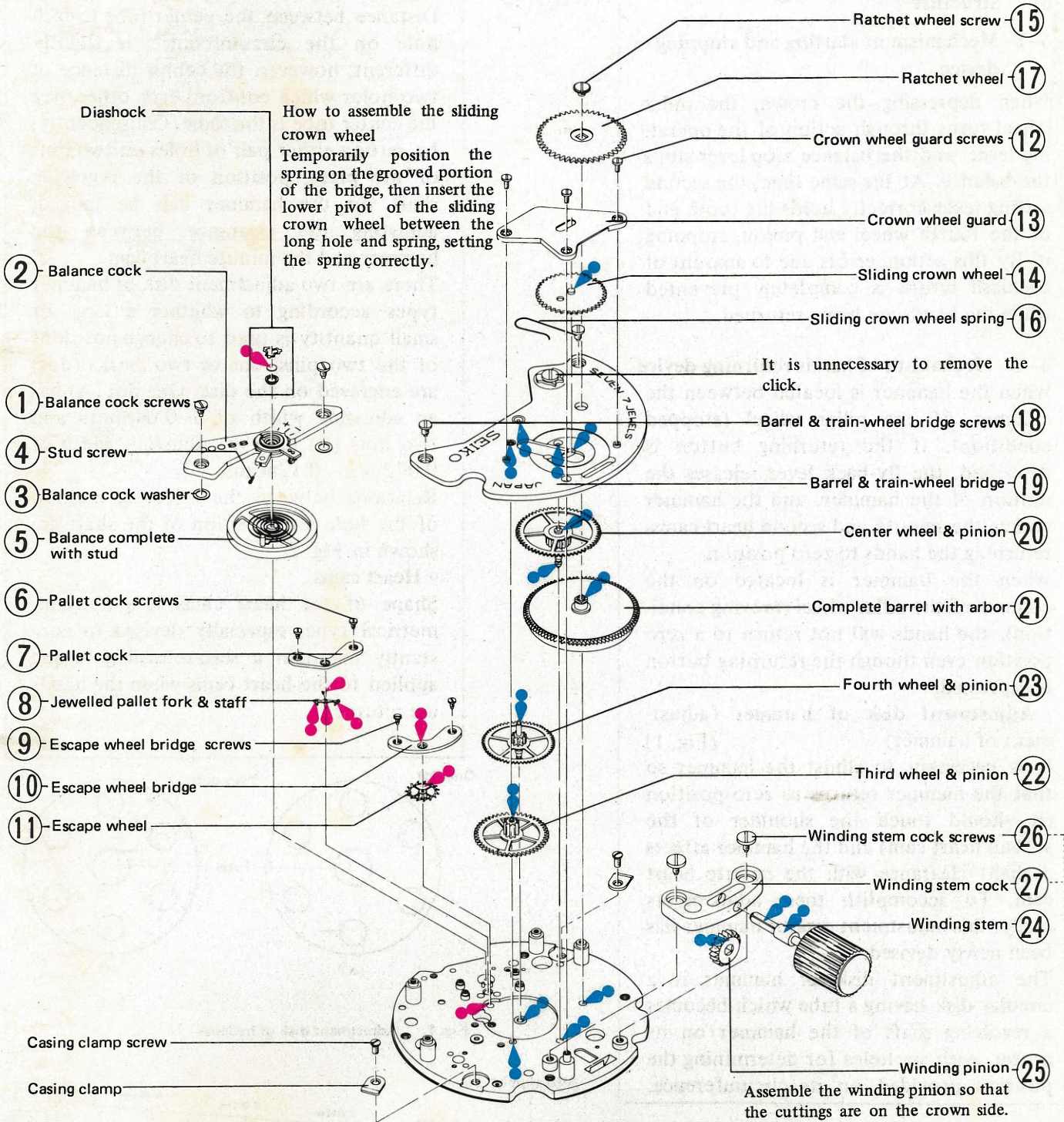
Detachment

Detach after turning bridge for intermediate hour recording wheel which is inclined toward plate, in the \dashrightarrow direction.

Attachment

Set intermediate hour recording in position after confirming that wheel bridge is in \dashrightarrow direction. Then turn intermediate hour recording wheel bridge to the \leftarrow direction.





- Diashock
- ② Balance cock
- ① Balance cock screws
- ④ Stud screw
- ③ Balance cock washer
- ⑤ Balance complete with stud
- ⑥ Pallet cock screws
- ⑦ Pallet cock
- ⑧ Jewelled pallet fork & staff
- ⑨ Escape wheel bridge screws
- ⑩ Escape wheel bridge
- ⑪ Escape wheel
- Casing clamp screw
- Casing clamp

- Ratchet wheel screw ⑮
- Ratchet wheel ⑰
- Crown wheel guard screws ⑫
- Crown wheel guard ⑬
- Sliding crown wheel ⑭
- Sliding crown wheel spring ⑯
- Barrel & train-wheel bridge screws ⑱
- Barrel & train-wheel bridge ⑲
- Center wheel & pinion ⑳
- Complete barrel with arbor ㉑
- Fourth wheel & pinion ㉓
- Third wheel & pinion ㉒
- Winding stem cock screws ㉖
- Winding stem cock ㉗
- Winding stem ㉔
- Winding pinion ㉕

6) Structure

6-1 Mechanism of starting and stopping device

When depressing the crown, the pillar wheel turns through action of the operating lever, and the balance stop lever stops the balance. At the same time, the second setting lever correctly holds the tooth end of the fourth wheel and pinion, stopping it. By this action, errors due to amount of backlash return is completely prevented while the hands are being returned.

6-2 Mechanism of hands returning device

When the hammer is located between the columns of the pillar wheel (stopped condition), if the returning button is depressed, the fly-back lever releases the motion of the hammer, and the hammer strikes the minute and second heart cams, returning the hands to zero position.

When the hammer is located on the column of the pillar wheel (moving condition), the hands will not return to a zero position even though the returning button is depressed.

Adjustment disk of hammer (adjustment of hammer) (Fig. 1)

It is necessary to adjust the hammer so that the hammer returns to zero position (it should touch the shoulder of the second heart cam) and the hammer effects a slight clearance with the minute heart cam. To accomplish these adjustments easily, this adjustment disk of hammer has been newly devised.

The adjustment disk of hammer is a circular disk having a tube which becomes a revolving shaft of the hammer on its center, with six holes for determining the position provided on its circumference.

Distance between the center tube to each hole on the circumference is slightly different; however, the center distance of two holes which confront each other over the center tube is the same. Consequently, by setting either pair of holes on two pins of the plate, position of the revolving shaft on the hammer can be moved, adjusting the clearance between the hammer and the minute heart cam.

There are two adjustment disk of hammer types according to whether a large or small quantity is used to change positions of the two pins; one or two marks (dot) are engraved on the disk. One dot (A) has an adjusting width of 0-0.048m/m and two dots (B) have an adjusting width of 0.072m/m-0.12m/m.

Relations between the selecting method of the hole and position of the shaft are shown in Fig. 2

o Heart cams

Shape of the heart cams is a nonsymmetrical type, especially devised to constantly maintain a zero-returning torque applied to the heart cams when the hands are returned.

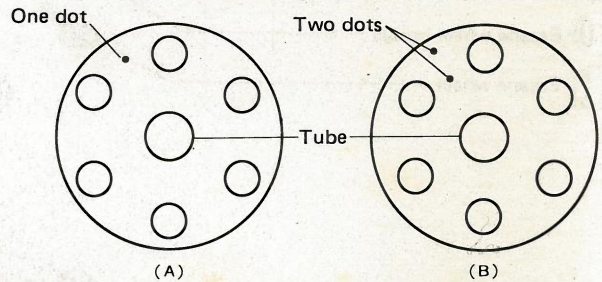


Fig. 1 Adjustment disk of hammer

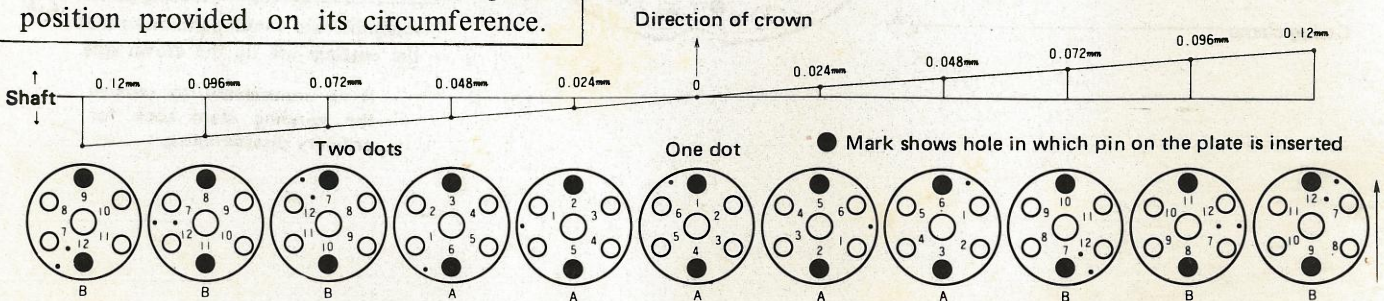


Fig. 2