PREFACE

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

It outlines the chracteristics 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.

INDEX

§ Instructions

§ Items in common to all SEIKO watches 8

§ Explanation of representative calibres 38

Instructions

1) Contents

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

The data are classified as follows :

1)-*1 Items in common to all SEIKO watches*

1)-2 *Explanation of representative calibres*

1. **An Index of calibres**
   (yellow page)

2. **A table of calibres**
   (blue page)

3. **Explanation of the nine SEIKO representative calibres**

2) Instructions for Use:

2)-*1 Items in common:*

For devices common to all SEIKO watches full instructions are given for disassembly, repair and reassembly, including cleaning, lubricating and casing (especially for waterproof watches). We have added explanations also of the instruments needed for repair and of testing machines. As these are common to all calibres of SEIKO watches, you may use these explanations along with the "Explanation of representative calibres."

2)-*2 Explanation of representative calibres*

Of the nine representative calibres of SEIKO watches, we have included detailed explanations of the characteristics of the movement, including construction, disassembly and reassembly, together with photographs.

With regard to the respective calibres, refer to a table of calibres. (Blue page) Our explanation is based on this table.

1. Calibre index method

(yellow page)

All calibres are listed and numbered in the index (yellow pages). On the upper section of an index page you will find page numbers of the calibre tables (blue page). Should you wish to locate the index number applying to a specific calibre, you may consult the table of calibres (blue page), in which the representative calibre of each is given.

2. Instructions for reading the Table of calibres

Each calibre is listed by calibre number, sub-name, numbers of jewel, movement dimensions and photograph.

Remarks 1: There are some movements without calibre numbers, but for each of these a sub-name is included in the calibre number columns.

Remarks 2: In order to facilitate indexing, the grouping has been made by characteristics of the movement and the movement dimensions. In a given group, a calibre expressed in Gothic letters represents a master calibre, shown by photograph.

For example: In the group under Cal. No. 10A there are three calibres (10A, 10B and 10M), which have been included as a single group because there are common points in mechanism and movement dimensions.

One or two parts of each movement are not interchangeable; this is the only difference between calibres listed under a master calibre. The master calibre of the group is indicated in Gothic (as for 10M, of which a photograph of the movement is given.)

Each calibre consists of a basic movement, to which one or more of the following may be added: date calendar, day of the week calendar, automatic winding, second setting, etc. (The whole has been so complied that the indexing may be done by the basic movement and each mechanism.)

Should a guide to the mechanism and repairing of a SEIKO watch be needed, open the case back of the watch and determine to which of the following three groups it belongs.

A. Those with a calibre number on the movement.

B. Those without a calibre number on the movement, but with a sub-name on the dial.

C. Those with neither.

A. Those with a calibre number on the movement:

Open to the appropriate page of the table of calibres (blue pages) and locate the number in the calibre number column. Next, open to the page containing representative calibres, locating the appropriate items in the columns classified by basic movements and accessory mechanisms. With regard to items common to all calibres, refer to the " items in common " section.

For example: If, having opened the case back, you find on the movement the calibre number " 7625A ", you would:

1) First locate 7625A in the index (yellow page) and then open to the appropriate page of the table of calibres. (blue pages).

INDEX OF CALIBRES

Cal. No.	Pages
6217A	X
6218A	IX
7622A	XII
7622B	XII
7625A	XII
7625B	XII

2) Secondly, locate 7625A in the table of calibres (page XII)

TABLE OF CALIBRES *Continued* XII

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	850	Champion 850	17	25.60ø	7606A	96						
	851	"	"	3.70	"	"						
	7625A	Sportsmatic Calendar 820	17	27.60ø	7606A	96	2105A	46			7606A	96
	7625B	"	"	5.70	"	"	"	"			"	"
	820	"	"		"	"	"	"			"	"
	7606A	Sportsmatic 5 Calendar	23	27.60ø	7606A	96	7606A	96	7606A	96	7606A	96

3) Any information required about the basic movement or accessory mechanisms may be located by referring to the appropriate column opposite the calibre number.

B. Those without a calibre number on the movement, but with a sub-name :

Locate the applicable sub-name in the cablibre column, opening to the table of calibres (blue pages) by using the index (yellow page). Confirm the movement from the photograph and movement dimensions. In the column of basic movements and accessory mechanisms on the appropriate page, consult the data on classified items of the representative calibres as well as their respective items.

For example: Should the sub-name "Seiko Solar" be printed on the dial, but no calibre number found on the movement;

1) First locate "Solar" in the calibre number column of the table of calibres (blue pages) using the index (yellow pages).

INDEX OF CALIBRES

Sub-names	Pages
Angel	IV
Birdie	IV
Seikomatic Lady	IV
Seikomatic Lady Calendar	IV
Solar	I
Sports Lady 17	III

2) Secondly, locate "Solar" in the table of calibres (blue pages) and find the calibre number in the appropriate column of the table.

TABLE OF CALIBRES

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions mm	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	10A	Solar	21	Casing Diameter	2105A	46						
	SOLAR	Solar	17	15.15×12.95	2105A	46						
	"	"	19	3.50	"	"						

C. Those with neither calibre number nor sub-name:

1. Check shape and dimension of the movement.
2. Refer to the table of calibres (blue page).
3. Locate calibre, matching shape and dimensions.
4. Refer to the page on which the appropriate calibre is listed.

Additional instructions will become available as new calibres are marketed. Filing directions will be provided so that the Technical Guide will be kept up-to-date.

INDEX OF CALIBRES

Cal. No.	Pages	Cal. No.	Pages	Cal. No.	Pages	Cal. No.	Pages	Sub-names	Pages
10A	I	2505A	V	6217A	X	8305B	XIII	**Angel**	IV
10B	I	2505B	V	6218A	IX	8305C	XIII	**Birdie**	IV
10M	I	290	VII	6220B	VIII	840	XIII	**Birdie pecial**	IV
1004A	I	3140	IX	6220C	VIII	850	XII	**Champion**	V
1004B	I	3180	VII	6220M	VIII	851	XII	**Champion Calendar**	VI
1004M	I	341	VII	6222A	VIII	860	XII	**Chorus**	III
1020A	I	375	X	6222B	VIII	9011A	XIII	**Chorus Calendar**	III
1020B	I	394	IX	6222M	VIII	9011B	XIII	**Cronos**	V
15A	II	395	IX	66A	X	9011C	XIII	**Fashion**	II
1520A	II	400	IX	66B	X	9011D	XIII	**Femi Laurel**	I
18A	II	402	VIII	6601A	XI	9011E	XIII	**Fine Seiko**	II
18M	II	410	XI	6601B	XI	9011F	XIII	**Gold Feather**	VIII
19A	II	430	VII	6602B	X	9011G	XIII	**King Seiko**	V
1920A	II	436	X	6606B	XI	9011H	XIII	**King Seiko w/second setting**	VI
205	X	4361	X	6619A	XI	9011I	XIII	**King Seiko Chronometer**	VI
21A	III	4420A	VI	6640A	X	9011K	XIII	**Lady Seiko**	II
21B	III	460	IX	6659A	XI	956	VIII	**Laurel**	VI
21C	III	54A	V	760	XI	957	X	**Lord Marvel**	VI
2102A	III	560	VII	7606A	XII			**Queen Seiko**	IV
2102B	III	5717A	VIII	761	XI			**Seikomatic Lady**	IV
2104A	III	5719A	VIII	7622A	XII			**Seikomatic Lady Calendar**	IV
2105A	IV	5722A	VII	7622B	XII			**Solar**	I
2107A	III	5740A	VII	7625A	XII			**Sports Lady 17**	III
2119A	III	60M	VIII	7625B	XII			**Sports Lady 17 Calendar**	III
245	XI	603	IX	790	XI			**Sportsmatic 5 Deluxe**	XII
2451	XI	6201B	IX	810	V			**Universe**	II
2501A	V	6205B	IX	820	XII			**Venus**	II
2501B	V	6206A	IX	830	XII			**Venus Special**	II

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges	Representative Calibres	Pages	Representative Calibres	Pages
	**15A** LADY SEIKO 〃 〃	**Lady Seiko** 〃 〃 〃	**21** **17** **19** **21**	**19.80×9.60** **3.50**	**2105A** 〃 〃 〃	**46** 〃 〃 〃								
	**1520A** FINE SEIKO 〃	**Fine Seiko** 〃	**17** 〃	**19.80×9.60** **3.50**	**2105A** 〃 〃	**46** 〃 〃								
	**18A** 18M UNIVERSE 〃	**Universe** 〃 〃 〃	**21** **17** **21** **17**	**13.50ø** **3.05**	**2105A** 〃 〃 〃	**46** 〃 〃 〃								
	**19A** VENUS 1920A VENUS SPECIAL	**Venus** 〃 **Venus Special** 〃	**17** **17** **21** **21**	**19.20×12.90** **3.50**	**2105A** 〃 〃 〃	**46** 〃 〃 〃								
	FASHION 〃	**Fashion** 〃	**17** **19**	**18.00×15.30** **4.40**	**7606A** 〃	**96** 〃								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges	Representative Calibres	Pages	Representative Calibres	Pages
	**21A**	**Sports Lady 17**	**17**	**17.80×15.30**	**2105A**	**46**								
	21B	〃	〃	**3.50**	〃	〃								
	21C	〃	〃		〃	〃								
	SPORTS LADY 17	〃	〃		〃	〃								
	**2102A**	**Sports Lady 17 Calendar**	**17**	**17.80×15.30**	**2105A**	**46**	**2105A**	**46**						
	2102B	〃	〃	**4.30**	〃	〃	〃	〃						
	SPORTS LADY 17 CALENDAR	〃	〃		〃	〃	〃	〃						
	**2104A**	**Chorus**	**17**	**17.80×15.30**	**1004B**	**38**								
	CHORUS	〃	〃	**4.40**	〃	〃								
	**2107A**	**Chorus Calendar**	**17**	**17.80×15.30**	**1004B**	**38**	**2105A**	**46**						
	CHORUS CALENDAR	〃	17	**5.20**	〃	〃	〃	〃						
	2107B	〃	21		〃	〃	〃	〃						
	CHORUS CALENDAR	〃	21		〃	〃	〃	〃						
	**2119A**	**Chorus Weekdater**	**21**	**17.80×15.30**	**1004B**	**38**	**2105A**	**46**	**7606A**	**96**				
				5.65										

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	QUEEN SEIKO	Queen Seiko	23	17.80×15.30 3.50	2105A	46								
	SEIKOMATIC LADY	Seikomatic Lady	21	17.80×15.30 5.75	2105A	46					2105A	46		
	SEIKOMATIC LADY CALENDAR 2105A	Seikomatic Lady Calendar	21	17.80×15.30 6.55	2105A	46	2105A	46			2105A	46		
	BIRDIE BIRDIE SPECIAL	Birdie Birdie Special	17 21	15.40×12.40 3.35	2105A 〃	46 〃								
	ANGEL 〃	Angel 〃	17 21	15.40×12.40 4.20	1004B 〃	38 〃								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	**2501A** 2501B	**Seikomatic Lady** 〃	**17** 〃	**17.20ø** **5.35**	**2105A** 〃	**46** 〃					**2505A** 〃	**58** 〃		
	**2505A** 2505B	**Seikomatic Lady Calendar** 〃	**21** 〃	**17.20ø** **5.50**	**2105A** 〃	**46** 〃	**2105A** 〃	**46** 〃			**2505A** 〃	**58** 〃		
	**54A** CRONOS 〃 〃 810	**Cronos** 〃 〃 〃 **Cronos Special**	**21** **17** **21** **23** **23**	**25.60ø** **4.00**	**7606A** 〃 〃 〃 〃	**96** 〃 〃 〃 〃								
	KING SEIKO	**King Seiko**	**25**	**25.60ø** **4.00**	**7606A**	**96**								
	CHAMPION 〃	**Champion** 〃	**71** **19**	**25.60ø** **4.00**	**7606A** 〃	**96** 〃								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges	Representative Calibres	Pages
	CHAMPION CALENDER	Champion Calendar	19	25.60ø 4.85	7606A	96	2105A	46						
	KING SEIKO w/Second-Setting	King Seiko	25	25.60ø 4.00	7606A	96							6218A	72
	4420A KING SEIKO CHRONOMETER	King Seiko Chronometer 〃	27 27	25.60ø 4.00	7606A 〃	96 〃							6218A 〃	72 〃
	LAUREL	Laurel 〃	17 〃	25.60ø 4.40	6218A 〃	72 〃								
	LORD MARVEL	Lord Marvel	23	25.60ø 4.40	6218A	72								

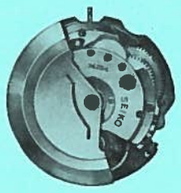
Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges	Representative Calibres	Pages
	290	G o Marvel	17	28.60 ø 6.55	6218A	72					6218A	72		
	560 〃 341	Crown 〃 Crown Special	19 21 23	27.60 ø 4.40	6218A 〃 〃	72 〃 〃							6218A	72
	5740A	Lord Marvel	23	27.60 ø 4.40	6218A	72							6218A	72
	3180	Grand Seiko	25	27.60 ø 4.40	6218A	72							6218A	72
	430 5722A	Grand Seiko Selfdater 〃	35 〃	27.60 ø 4.75	6218A 〃	72 〃	6218A 〃						6218A 〃	72 〃

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	5719A	Crown Chronograph	21	27.60 ø 6.10	5719A	60								
	5717A	Crown Chronograph Calendar	21	27.60 ø 6.45	5719A	60	6218A	72						
	**60M** GOLD FEATHER	Gold Feather 〃	17 25	26.60 ø 2.95	7606A 〃	96 〃								
	6220B 6220C **6220M** 402	Skyliner 〃 〃 〃	21 21 17 21	25.60 ø 3.35	6218A 〃 〃 〃	72 〃 〃 〃								
	6222A 6222B **6222M** 956	Skyliner Calendar 〃 〃 〃	21 21 17 21	27.60 ø 3.90	6218A 〃 〃 〃	72 〃 〃 〃	2105A 〃 〃 〃	46 〃 〃 〃						

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	3140 〃	Liner 〃	21 23	25.60 ø 3.35	6218A 〃 〃	72 〃								
	460	Liner Chronometer	25	25.60 ø 3.35	6218A	72							6218A	72
	6201B 〃 603 〃 〃 〃	Seikomatic 〃 〃 〃 〃 〃	17 21 17 20 21 30	27.60 ø 4.80	6218A 〃 〃 〃 〃 〃	72 〃 〃 〃 〃 〃					6218A 〃 〃 〃 〃 〃	72 〃 〃 〃 〃 〃		
	394 395 6205B 〃	Seikomatic Selfdater 〃 〃 〃	24 39 17 24	27.60 ø 5.35	6218A 〃 〃 〃	72 〃 〃 〃	6218A 〃 〃 〃	72 〃 〃 〃			6218A 〃 〃 〃	72 〃 〃 〃	6218A	72
	400 6206A 6218A	Seikomatic Weekdater 〃 〃	33 26 35	27.60 ø 5.60	6218A 〃 〃	72 〃 〃	6218A 〃 〃	72 〃 〃	6218A 〃 〃	72 〃 〃	6218A 〃 〃	72 〃 〃	6218A	72

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges
	6217A	World Time	17	27.60ø 5.35	6218A	72	6218A	72			6218A	72		
	436 4361 66A 66B	Sportsman 17 〃 〃 〃	17 〃 〃 〃	23.60ø 3.85	6619A 〃 〃 〃	86 〃 〃 〃								
	6602B 957	Sportsman 17 Calendar 〃	17 〃	27.60ø 4.45	6619A 〃	86 〃	2105A 〃	46 〃						
	205	Harmony	19	23.60ø 3.85	6619A	86								
	375 6640A	Disney Time 〃	7 〃	23.60ø 3.55	6619A 〃	86 〃								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	**6659A**	School Time	7	23.60 ø 4.80	**6619A**	86			**6619A**	86				
	245 2451 6601A **6601B**	Sportsmatic 〃 〃 〃	17 〃 〃 〃	27.60 ø 5.40	**6619A** 〃 〃 〃	86 〃 〃 〃					**6619A** 〃 〃 〃	86 〃 〃 〃		
	**790**	Sportsmatic Calendar	19	27.60 ø 6.00	**6619A**	86	**2105A**	46						
	410 6606B **6619A**	Sportsmatic 5 〃 〃	21 〃	27.60 ø 6.40	**6619A** 〃 〃	86 〃 〃	2105A 〃 6619A	46 〃 86	6619A 〃 〃	86 〃 〃	6619A 〃 〃	86 〃 〃		
	**760** 761	Fairway 〃	21 〃	25.60 ø 3.70	**7606A** 〃	96 〃								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Peges	Representative Calibres	Pages	Representative Calibres	Pages
	**850** 851	**Champion 850** 〃	**17** 〃	**25.60 ø** **3.70**	**7606A** 〃	**96** 〃								
	**7622A** 7622B 860	**Champion Calendar 860** 〃 〃	**17** 〃 〃	**27.60 ø** **4.25**	**7606A** 〃 〃	**96** 〃 〃	**2105A** 〃 〃	**46** 〃 〃						
	**7625A** 7625B 820	**Sportsmatic Calendar 820** 〃 〃	**17** 〃 〃	**27.60 ø** **5.70**	**7606A** 〃 〃	**96** 〃 〃	**2105A** 〃 〃	**46** 〃 〃			**7606A** 〃 〃	**96** 〃 〃		
	**7606A** SPORTSMATIC 5 DELUXE	**Sportsmatic 5 Deluxe** 〃	**23** 〃	**27.60 ø** **6.25**	**7606A** 〃	**96** 〃	**7606A** 〃	**96** 〃	**7606A** 〃	**96** 〃	**7606A** 〃	**96** 〃		
	**830**	**Seikomtic Slim**	**30**	**28.60 ø** **3.80**	**8305C**	**108**								

Photos	Cal. No.	Sub-Names	Jewels	Movement Dimensions (mm)	Basic Movement		Calendar (Date)		Calendar (Day of the Week)		Automatic Winding		Second Setting	
					Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages	Representative Calibres	Pages
	8305B **8305C** 840	**Seikomatic Slimdate** **Seikomatic-R** **Seikomatic Slimdate**	**30** 〃 〃	**28.60ø** **4.55**	**8305C** 〃 〃	**108**	**8305C** 〃 〃	**108**			**8305C** 〃 〃	**108**		
	9011A 9011B 9011C 9011D 9011E 9011F **9011G** 9011H 9011I 9011K		**15** 〃 〃 〃 〃 〃 〃 〃 〃 〃	**40.25ø** **7.35**	**9011G** 〃 〃 〃 〃 〃 〃 〃 〃 〃	**120**								

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

❶ dynamic stability,
❷ high resistance to shock,
❸ improved oil retention,
❹ wide interchangeability, making for easy service.

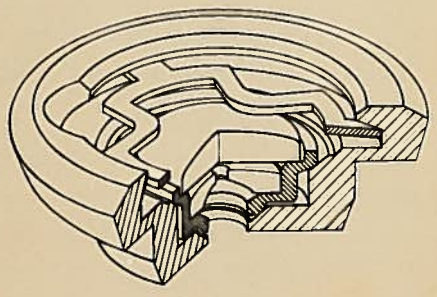


Fig. 1

Disassembly

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

Application of lubricating oil.

After cleaning, lubricating oil (Moebius Synt-A-Lube) must be applied, as shown in Fig. 3.

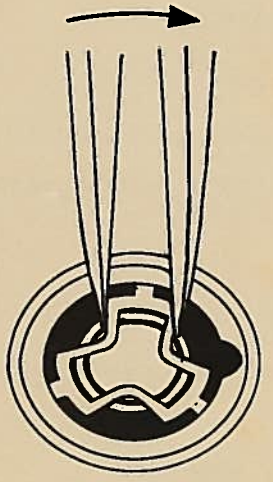


Fig. 2

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.

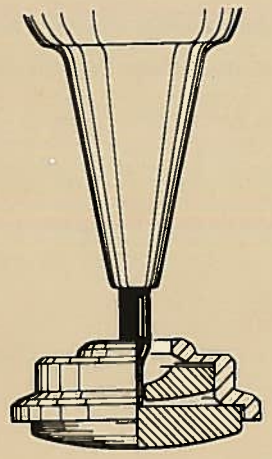


Fig. 3

Diafix

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

❶ 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.

❷ Diafix enables the easy adjustment of pinion end shake.

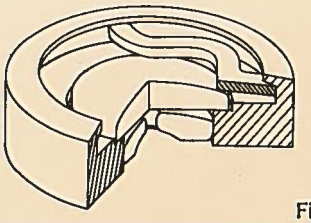


Fig. 1

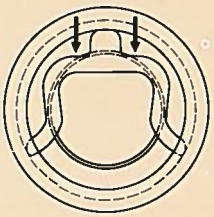


Fig. 2

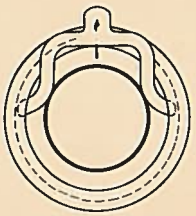


Fig. 3

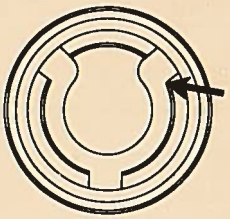


Fig. 4

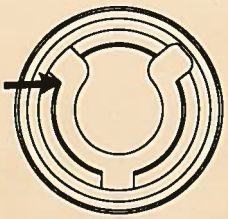


Fig. 5

Fig. 6

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.

Diaflex (Mainspring)

Salient features of Diaflex

1) All SEIKO watches contain " unbreakable mainsprins ".
2) Mainsprings of SEIKO hand-wound watch do not require lubrication ; they are processed for self-greasing.

Unbreakable mainspring

This mainspring is made of a special alloy, chiefly of cobalt, nickel and chrome.
The spring is unbreakable, stainless, fatigueless and has a high degree of torque for its thickness.

Self-greasing mainspring

The self-greasing mainspring has a stable and long-term output without lubrication because the surface of the spring is coated with a special membrane that acts as a lubricant.
The effect of the special membrane never changes even if it is cleaned or lubricated by mistake.

Note : The rubber of the barrel arbor, barrel drum and barrel cover must nevertheless be oiled.

Mainsprings of automatic-winding watches

1) Effect :

In most automatic-winding watches, the oscillating weight rotates continually and may wind the mainspring excessively. The mainsprings of SEIKO automatic winding watches, however, have a friction spring called the "slipping attachment" (1) to prevent breaking the mainspring by over-winding, and (2) to avoid knocking.
Nor is there a groove on the inner wall of the barrel. If the mainspring is wound more than required, the slipping attachment will begin to slip releasing the unnecessary tension.

2) Disassembly and reassembly

It is better not to disassemble the barrel complete of SEIKO automatic-winding watches since the mainspring is treated with a special grease, Moebius Molycote, which eliminates cleaning and lubricating semi permanently.
The barrel complete must be wiped, however, and lubricating oil should be applied to the rubber of the barrel arbor, barrel drum and barrel cover.
If it does become necessary to overhaul the barrel complete, disassemble and clean in the following manner.

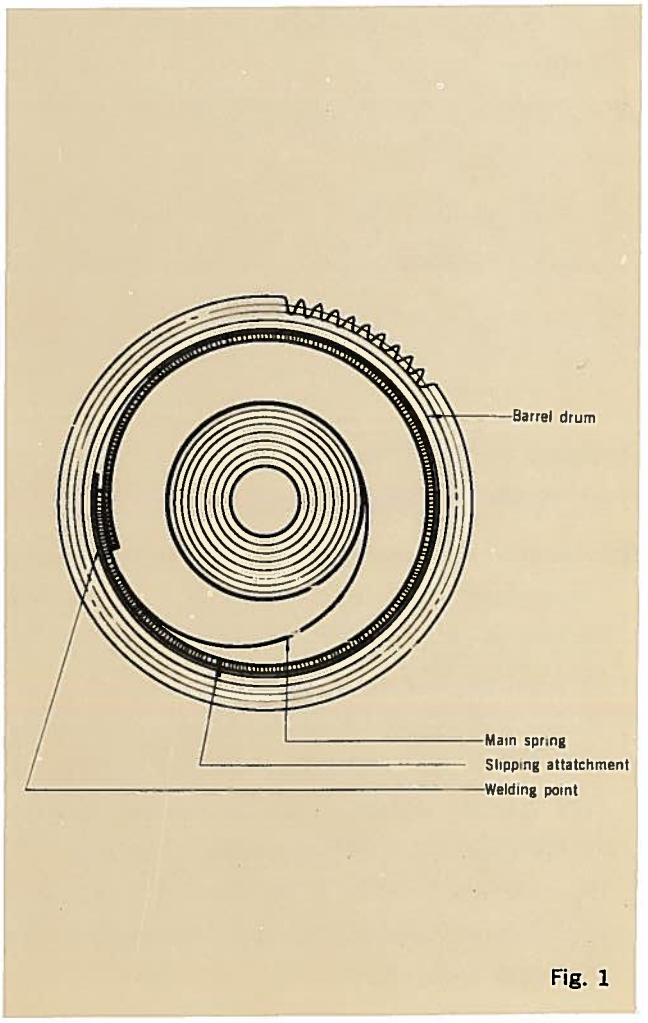


Fig. 1

Disassembly

1) Remove the barrel cover (facing upward) by depressing the barrel drum.
2) Remove the barrel arbor.
3) Take out the mainspring by pulling up the inner end.
4) Clean all parts with benzine or trichlorethylene.

Reassembly :

❶ Apply lubricating oil (Moebius-Molycote) to the base and side wall of the barrel drum.

Note : Never apply grease used for ordinary mainsprings.

❷ Put the mainspring in the barrel drum. Take care not to change of the slipping attachment insertion.

❸ Apply lubricating oil to the surface of the mainspring.

❹ Put in the barrel arbor and set the cover.

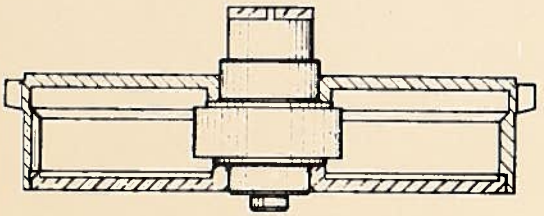


Fig. 2. Ordinary type

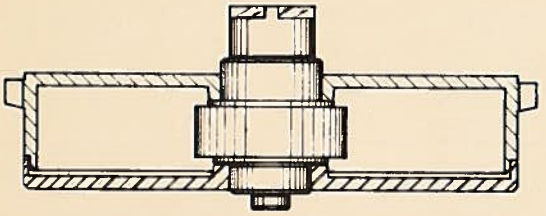


Fig. 3. Special type
(ex.For Seikomatic lady)

Fig. 4. Main spring with slipping attachment

Checking the operation of the slipping attachment :

❶ Set the reassembled barrel complete into the movement, and then turn the ratchet wheel screw more than eight rounds in order to wind the mainspring fully.

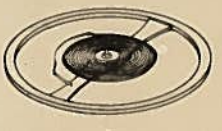
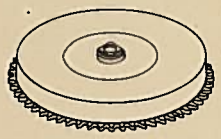
❷ Leave the movement as it is for about 10 minutes.

❸ Turn back the mainspring gradually and count the number of turns. If the number of turns is more than 5.5, good operation is assured.

❹ In case the number is less than 5.5, adjust the slipping attachment so that it presses firmly the side wall.

Cleaning of parts

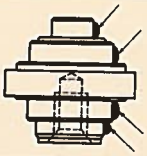
Special care is necessary in cleaning the following parts

	Gasket	Pallet complet	Barrel complete	Balance complete
	 Fig. 1	 Fig. 2	 Fig. 3	 Fig. 4
Benzine or Triclorethylene	—	V	V	*
Alcohol	V	—	—	—

Note : **Checks (V) indicate suitable cleaning procedures. The barrel complete (*) may be wiped gently with a cloth dipped in benzine. Other parts may be cleaned with benzine, alcohol or trichlorethylene, though ultransonic-wave cleaning is especially effective.**

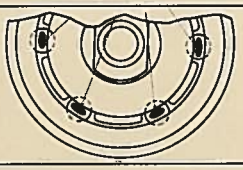
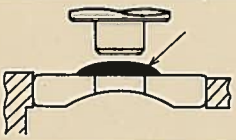
Oiling

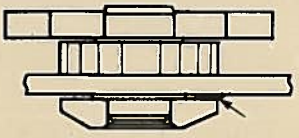
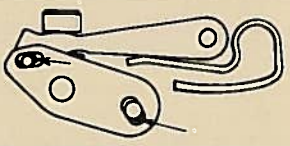
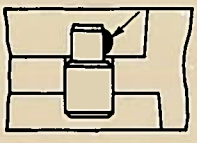
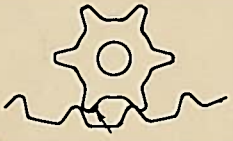
The kinds of oil to be applied to various parts of SEIKO watches are specified in the charts below. The parts must be cleaned thoroughly before they are oiled, to increase the efficiency of the lubricating oil.

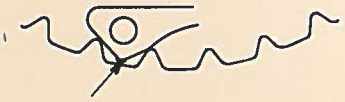
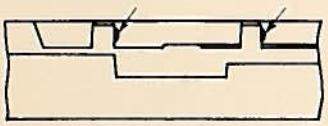
Parts	Oiling position	Oil used
Mainspring (automatic-winding watch only)	 Fig. 1	SEIKO SPECIAL MAINSPRING GREASE
Barrel arbor	 Fig. 2	MOEBIUS SYNT-A-LUBE
Center wheel pivot		MOEBIUS SYNT-A-LUBE
Third wheel pivot		〃
Fourth wheel pivot		〃
Escape wheel pivot		〃
Pallet jewel		MOEBIUS Chrono-meters
Balance wheel pivot		MOEBIUS SYNT-A-LUBE
Winding and setting mechanism		〃
Setting wheel pin		〃
Minute wheel pivot		〃
Cannon pinion		〃

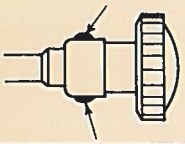
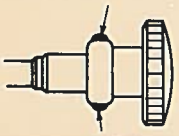
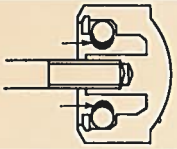
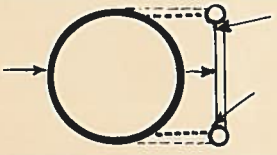
Note 1: **The mainspring of a hand-wound watch requires no oiling, since it is self-greasing.**

Note 2: **The pallet pivots should never be oiled.**

Automatic devices		Oiling position	Oil used
Ball-bearing		 Fig. 3	Moebius A
Pawl lever with jewel		 Fig. 4	Moebius A
Hole jewel for pawl lever		 Fig. 5	(Moebius grease "Remontoires")
Transmission wheel	Teeth part	 Fig. 6	Moebius A
	Lever pivot	 Fig. 7	Moebius A
	Upper pivot	 Fig. 8	Moebius A

Calendar devices	Oiling position	Oil used
Setting wheel lever mounted	 Fig. 9	Moebius A
Yoke (Clutch lever)	 Fig. 10	Moebius A
Setting wheel lever pin	 Fig. 11	Moebius A
Date corrector wheel mounted	 Fig. 12	Moebius A

Calendar devices		Oiling position	Oil used
Date jumper Day jumper		 Fig. 13	Moebius A
Date driving wheel Intermediate date wheel	without pivot	 Fig. 14	Moebius A
	with pivot	 Fig. 15	Moebius A
Cannon pinion (only for calendar)		 Fig. 16	Moebius A
Day jumper		 Fig. 17	Moebius A

Outer parts		Oiling position	Oil used
Crown-gasket	Non-waterproof case	 Fig. 18	Silicon grease (500,000 C.S.)
	Waterproof case	 Fig. 19	Silicon grease (500,000 C.S.)
	Non-waterproof or waterproof case	 Fig. 20	Silicon grease (500,000 C.S.)
Gasket		 Fig. 21	Silicon grease (500,000 C.S.)

Casing (Seiko waterproof case)

1. Construction of waterproof cases (*Model Types*)

Type 1. Bezel : Glass squeeze-in type
Case back : Snap type
Crown : Non-automatic

Features

1) The bezel and the case band come in one body, which forms a comparatively thin waterproof case.

2) The glass is mounted directly on the case by adhesive, and maintains its waterproofness.

3) The case back is of the snap type. Waterproofing is maintained by an "O" ring gasket between the case, band and the case back.

Type 2. Bezel : Hooped type
Case back : Screw type
Crown : Non-automatic

Features

1) The screw portion and the gasket are separated, eliminating the necessity of cutting or twisting gasket when mounting the case back.

2) The glass is pressed tightly by the bezel. Waterproofness is maintained by contact of the inner surface of the glass with the case.

Type 3. Bezel : Hooped type
Case back : Screw type
Crown : Automatic-winding type (recessed)

Features

1) Since the crown is not used to wind the mainspring, it is small and is recessed in the case.

2) The glass is pressed tightly by the bezel. Waterproofness is maintained by contact of the glass with the case.

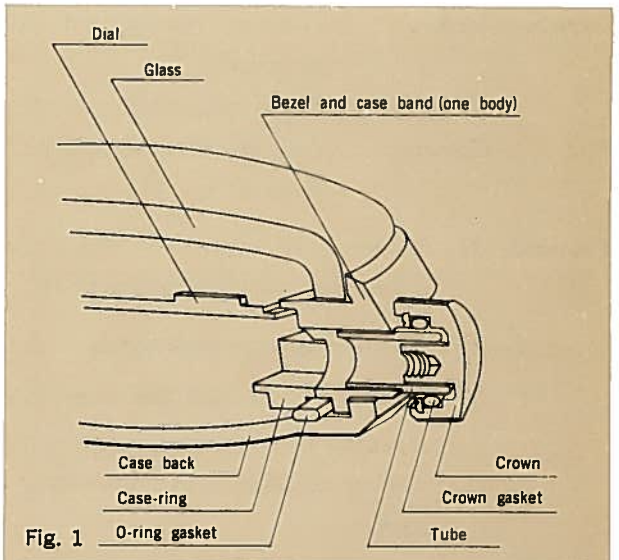


Fig. 1

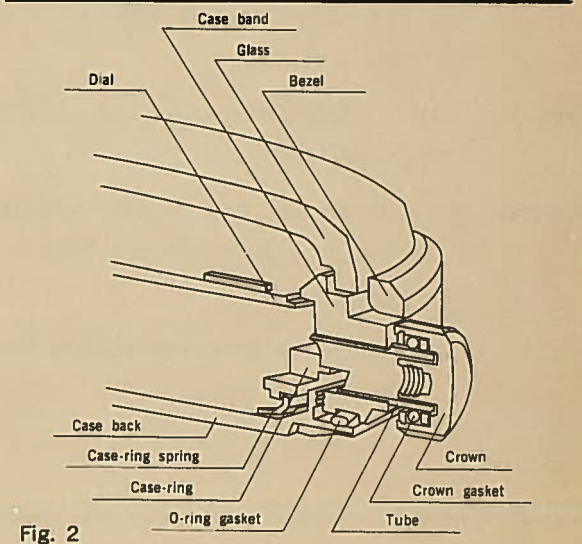


Fig. 2

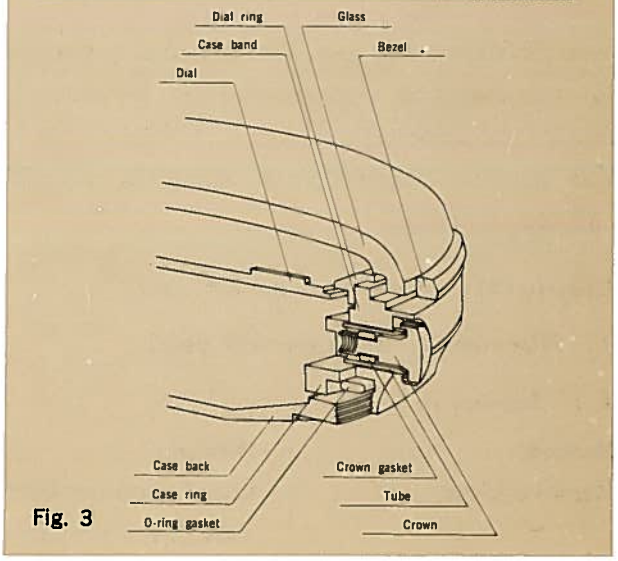


Fig. 3

Type 4. Bezel : Hooped type (gasket under glass is employed)
Case back : Screw-ring type
Crown : Automatic-winding type (with indicator)

Features *1*) A gasket is employed under the glass, providing better waterproofness.

2) A screw ring is employed.

3) The case back and the screw portion are separate, eliminating the necessity of cutting or twisting when mounting the case back.

4) The movement is held by a dial press ring and gasket.

Type 5. Bezel : One-piece type with tension ring
Crown : Crown with joint-stem

Features *1*) The tension ring is employed inside the glass, providing waterproofness of especially high quality.

2) Due to the one-piece construction, a joint stem is employed.

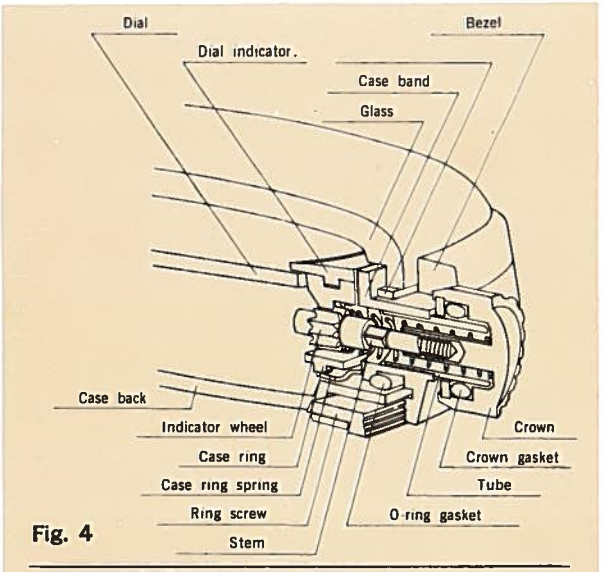


Fig. 4

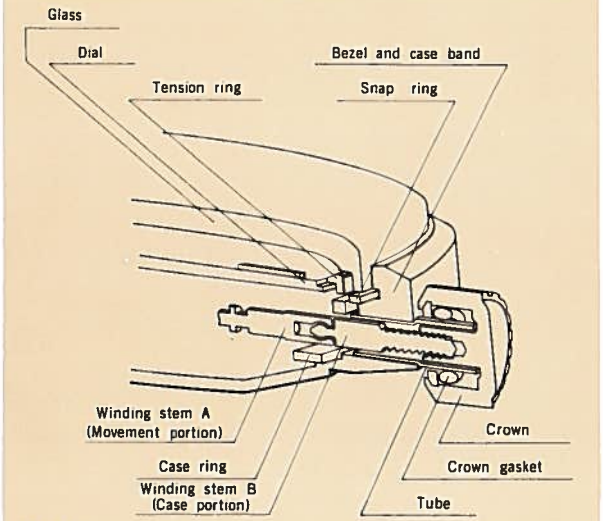


Fig. 5

2. Disassembly and reassembly of waterproof cases

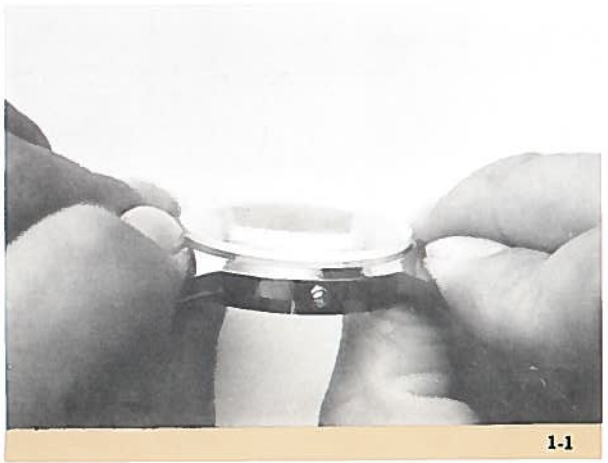
The SEIKO waterproof case includes special parts, and the waterproofing mechanism must be studied before repairs are undertaken.
Use genuine SEIKO parts. Carefully assemble them and test thoroughly.

Disassembly of the waterproof case

1) Disassembly of glass and bezel

***1*–1 Squeeze-in type**

Method	Remarks
Remove glass	Glass need not be removed except for replacement.


1-1

1–2 Hooped type

Method	Remarks
1. Remove bezel with case opener.	Bezel need not be removed except when glass is replaced.
2. Remove glass	
3. Remove dial-ring or gasket	

1–3 Tension ring type

Method	Remarks
1. Remove case back,and then movement	
2. Remove glass from case by pushing with tightening tool from inside of case.	Refer to " Tools for waterproof case " for details on tightening tool.
2–1 Select case holder matching bezel	
2–2 Place case on holder with glass down.	
2–3 Set mounting jig on spindle	
2–4 Push hand lever	

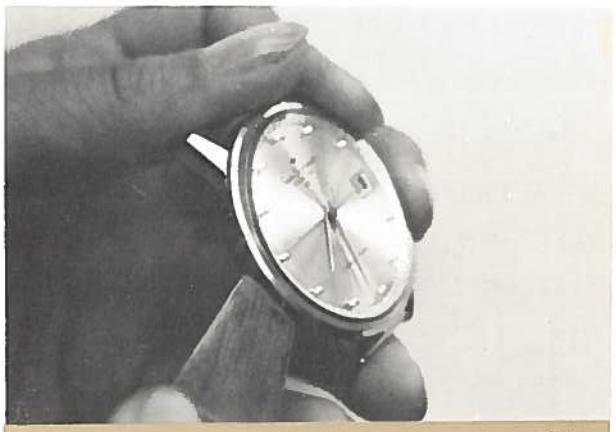
2) *Disassembly of case back*

2–1 Snap type

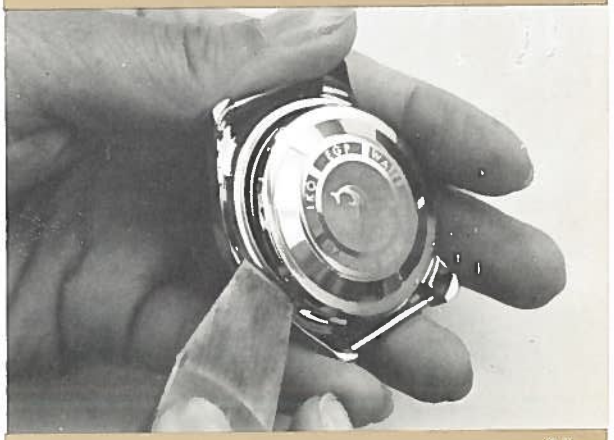
Method	Remarks
Remove case back with case opener	

2–2 Screw type and ring screw type

Method	Remarks
1. Set case in holder with glass facing down, and fix in vice.	Refer to " Tools for waterproof case," for usage of holder, opener, etc.
2. Remove case back with appropriate opener.	



1-2



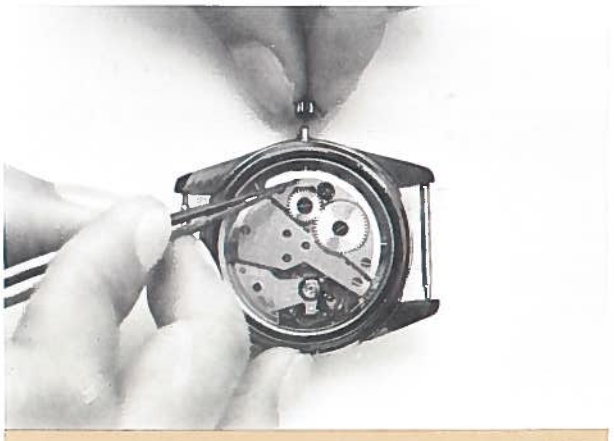
2-1

2-2

3) Disassembly of crown with stem

3–1 Crown with ordinary stem

Method	Remarks
There are two ways to remove crown.	
1. Setting lever screw type : Loosen setting lever screw until crown can be pulled out.	
2. Setting lever pin type : Push setting lever pin with tweezers and pull out crown.	Be careful not to push pin excessively.



3-1-1

3-1-2

3–2 Crown with joint stem

Method	Remarks
1. First remove glass, bezel, gasket, dial ring and related parts.	
2. Carefully turn watch to dial-down position.	
3. Turn crown slowly counterclockwise untill joint of stem becomes unlocked and Movement becomes apart.	Be careful not to drop and crush movement.

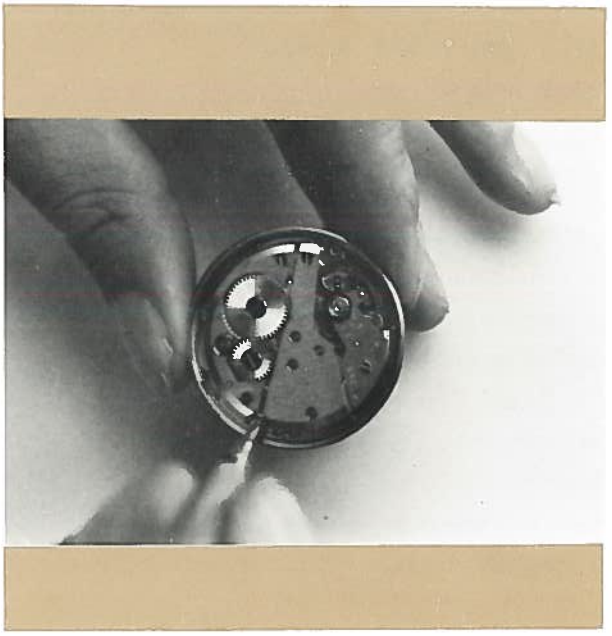
4) *Cleaning of parts*

Cleaning \ Parts	Case	Glass	Gasket	Crown
Method	Brush	Silicon Cloth	Brush	Brush
Solution	Benzine or Trichlor-ethylene	—	Alcohol or Benzine	Alcohol or Benzine
Temperature of solution	Below 40°C (100°F)	—	Below 40°C (100°F)	Below 40°C (100°F)
Drying temperature	Below 40°C (100°F)	—	Below 40°C (100°F)	Below 40°C (100°F)
Time Allowance	Unlimited	—	Less than 5 minutes	Less than 5 minutes
Solutions not to be used	—	No solution may ever be used	Thinners or trichlor-ethylene	Thinners or trichlor-ethylene

5) *Reassembly of waterproof case*

5–1 Case-ring and movement

Method	Remarks
Set movement into case ring and fasten with case screw.	When fastening case, check stem hole position.



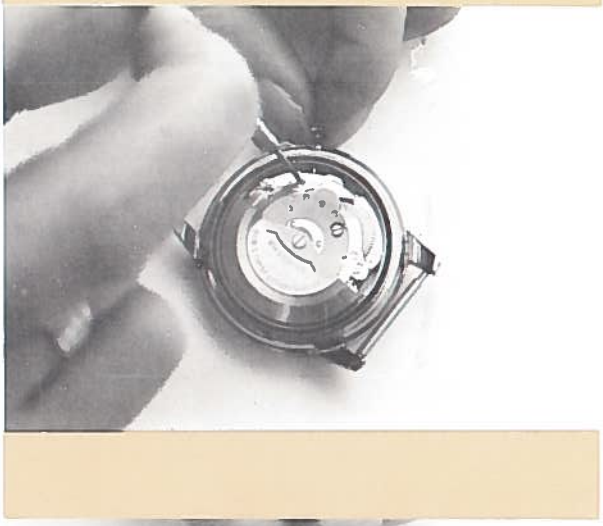
5–2 Case-ring with movement and case

Method	Remarks
1. Set movement with case-ring in the case 2. Fix case-ring spring 3. Place " O " ring gasket in its channel	1. Remove crown from movement beforehand. 2. Apply special Seiko silicon grease (500,000 c.s.) to gasket. 3. Check stem hole position.

6) *Crown with stem*

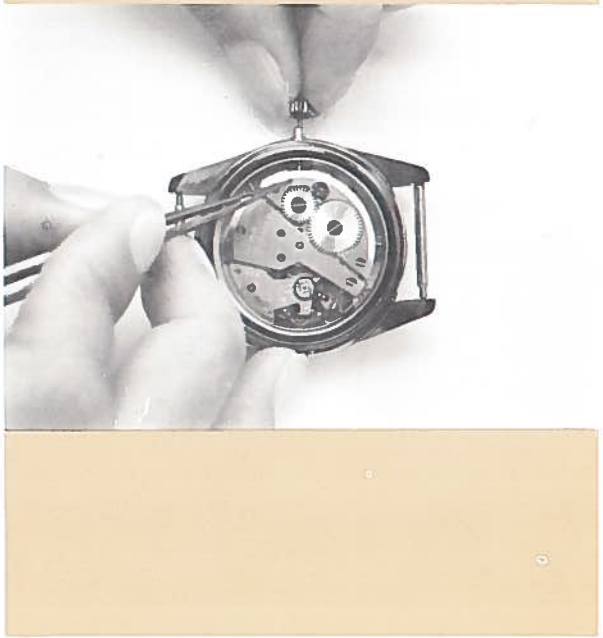
6–1 Automatic and non-automatic

Method	Remarks
There are two methods for mounting winding stem with crown. 1. Setting lever screw type : Insert winding stem into winding stem hole of case. Tighten setting lever screw. 2. Setting lever pin type : Depress setting lever pin and insert winding stem with crown into winding stem hole of case.	1. Scratched crown gasket should be replaced. 2. Use special Seiko silicon grease (500,000 c.s.) on crown gasket. 3. With setting lever pin type, do not apply excessive pressure on pin when inserting crown into case. 4. While inserting winding stem with crown turn crown slowly.



6–2 Crown with joint stem

Method	Remarks
1. Insert movement (with winding stem...movement portion) into case. 2. Insert crown (with winding stem...case portion) into case tube and push in, turning counterclockwise carefully	Face winding stem...movement portion to winding stem hole of case properly.



7) *Reassembly of case back*

7-1 Snap type

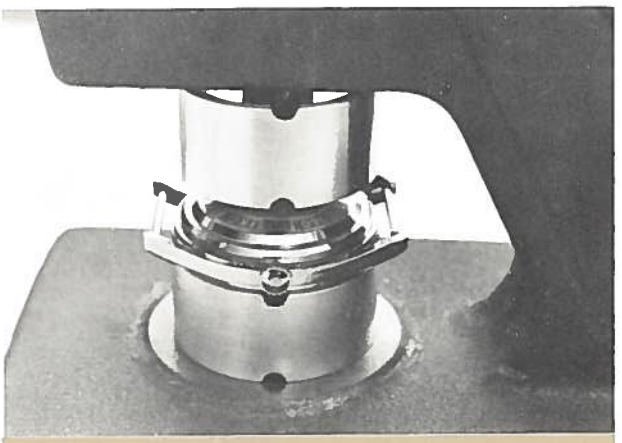
Method	Remarks
Use SEIKO waterproof case tightening tool for snap type case.	1. Refer to " Waterproof Tools " 2. Take care that " O " ring does not twist and come off groove.

7-2 Screw type

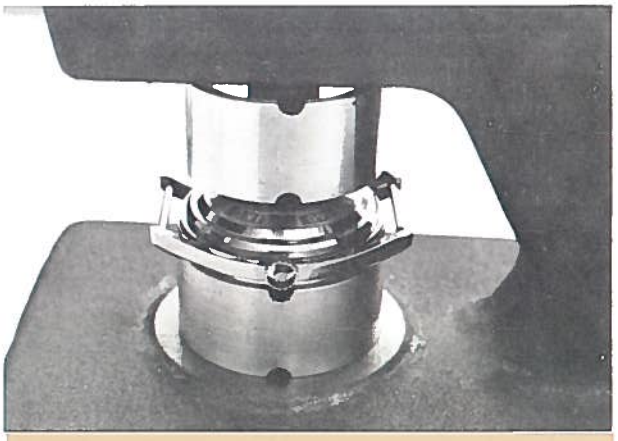
Method	Remarks
1. Set proper case holder on vice. 2. Set case on case holder with glass down, and replace case back. Then screw in by hand. 3. Tighten thoroughly with opener tool.	1. Refer to " Waterproof Tools " 2. Take care not to use defective gasket. 3. Take care not to scratch case back by opener to slip.

7-3 Ring screw type

Method	Remarks
1. Set case holder corresponding to case on vice. 2. Put case on case-holder with glass facing downward. 3. Replace case back 4. Then ring screw on case back. 5. Tighten screw firmly with tightening tool.	1. Refer to " Waterproof Tools " for information on case holder and tightening tool. 2. Coincide rotation step key of case back with groove of case. Turn ring screw with fingers to assure correct setting. 3. Take care not to scratch case back when tightening.



8) Reassembly of glass and bezel



8–1 Hooped type

Method	Remarks
(For reassembly of hooped type, use SEIKO water-proof tightening tool.) 1. Set dial ring on case. 2. Replace glass, and place bezel on case with tightening tool.	1. Refer to " Waterproof Tools " for tightening method. 2. In some cases, a gasket is used under glass. 3. There should be no gap between bezel and case.

8–2 Tension ring type

Method	Remarks
1. Set case holder and mounting jig properly on spindle of tightening tool. Put case correctly on tool. 2. Set glass on case. Set minute track of tension ring to hour markers on dial (applies to tension ring with minute track). 3. Carefully insert glass with tightening tool. If glass does not set in case correctly, water-proofing cannot be guaranteed.	1. Refer to " Waterproof Tools " for information on selection of case holder, mounting jig, etc. 2. Glass should not be inserted if scratches or dust are found on external surface of glass or on in-side surface of case. 3. Avoid scratching glass by using vinyl film or similar substance.

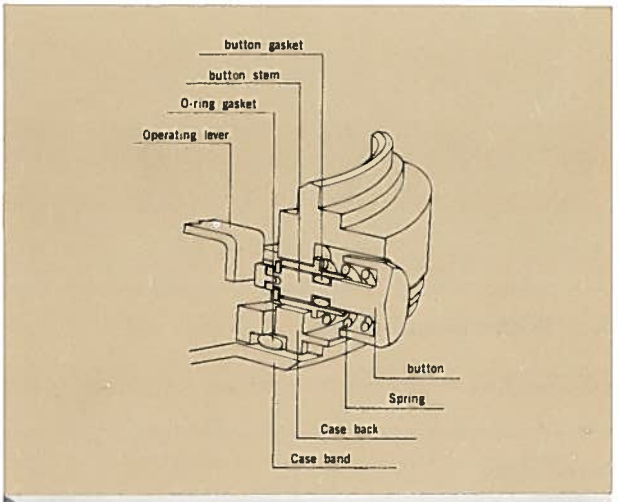
9) Disassembly and reassembly of date-setting button

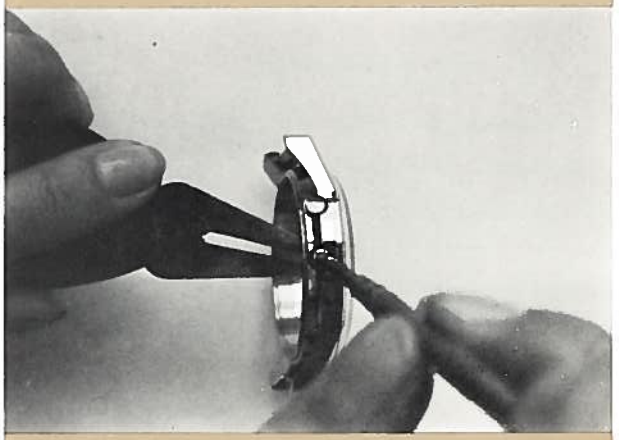
9–1 Disassembly of date-setting button

Method	Remarks
1. Hold end of button stem as shown in figure. 2. Remove button with screw driver.	Do not disassemble button mechanism except for repairs.

9–2 Reassembly of date-setting button

Method	Remarks
1. Set gasket on button stem and apply silicon grease. 2. Insert button stem into button hole of case from inside, with screw portion forward. 3. Place button spring on button stem from outside case. 4. Place button on button stem tightly with screw driver.	1. Do not use defective gasket. 2. Apply proper quantity of silicon grease. (Seiko special silicon, 500,000 c.s.) 3. Do not apply excessive force when inserting button stem. Tighten firmly to prevent loosening.





3. Waterproof Test

All SEIKO waterproof watches available on the market have undergone the following rigid waterproof tests.

1) Pressure-reduction Test

A watch is placed in the pressure-reduction test instrument, and the pressure is reduced to half that of the atmosphere. The pressure within the watch remains that of the atmosphere. If the airtightness of the watch is defective, air will leak from the watch and cause bubbles in the instrument.

2) Pressure Test

After completing the pressure reduction test, the watch is subjected to a pressure test carried out under three atmospheric pressures.

The watch is placed in the pressure test instrument and the pressure is gradually increased. When the pressure reaches the designated level, the pressure is maintained for a few minutes.
If the watch is not sufficiently resistant, water will penetrate into the watch as the pressure increases.

3) Heat Test

In order to insure that water has not penetrated into the watch, a heat test is conducted.
After the pressure test, the watch is placed with the glass up, on an iron plate heated to approximately 45°C (113°F). Only the inside of the watch is heated, and the surface of the glass is at a lower temperature since it is exposed to the air.
If water has penetrated it will form dew-drops on the inner surface of the glass.
All SEIKO watches have satisfactorily passed these strict tests.

Instruments for repairing and Testing machines

I Tools for the waterproof case and their handling

1. Case tightening tool:

With an even pressure over the entire area of contact between case and case-holder, this tool tightens the bezel and snapcase-back of waterproof cases.
Because of its 15 mounting jigs, the tool can be used for all SEIKO waterproof cases.

1-*1*) Set a mounting jig matching the case on the spindle of the tool. (There is no particular designation as to upper or lower portion. Upper and lower portions should fit together at the crown portion of the mounting jig.)

1-*2*) Set the case firmly on the jig. Be sure the crown of the watch fits the corresponding crown portion of the jig.

Note: When mounting the bezel, place the opening portion of the bezel at the 6 o'clock position.

1-*3*) Place a thin vinyl sheet on the bezel to avoid scratching.

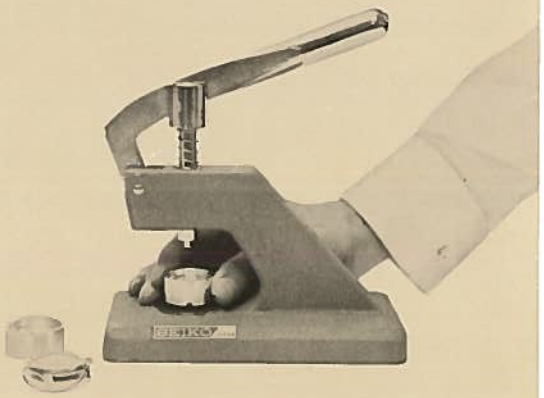
1-*4*) Slowly push the lever until the jig barely holds the bezel (or case-back).

1-*5*) Check the position of the case and exert force on the lever.

Note 1: When mounting the bezel, hold it horizontally so that pressure is applied evenly.

Note 2: In setting the case-back, take care that the opening portion is placed at the 9 o'clock position.

Tightening tool Fig. 1



Tightening tool Fig. 2

2. Opener and case-holder

The screw-in case-back of SEIKO waterproof watch can easily be removed and replaced with this tool set.

Two types of spanners are available.

(1) Pin-spanner

(1–*1*) Adjust the distance of pins to the grooves on the case-back.

(1–*2*) The case-back may be removed by fitting the pins into the grooves and turning the spanner, provided that the watch is placed on the proper case-holder fixed on the vise.

(2) Box-spanner

This is used for the octagonal case-back.

3. Waterproof test instrument

Waterproofness must be tested by reduction of pressure, by application of pressure and by condensation.

Test instruments for SEIKO waterproof watches are shown here.

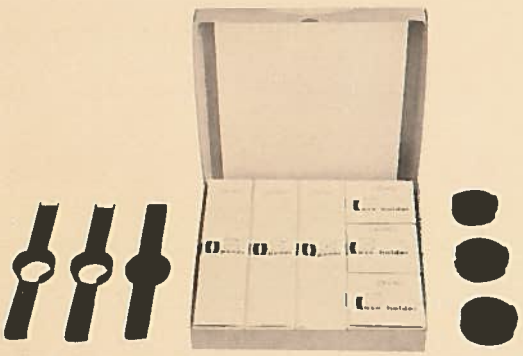


Fig. 3 Opener set

Fig. 4 Waterproof test instrument

II Auto-cleaner

SEIKO Auto-clearner (Model 2) is fully automatic and is equipped with ULTRASONIC CLEANING DEVICE which will increase efficiency and reduce overhead.

1. Principle of Ultrasonic Cleaning

The audible limit of sound waves is between 16 and 20,000 cycles per second. Sound waves more than 20,000 cycles per second are called "ultrasonic" and cannot be heard by human ears. "SEIKO" Auto-cleaner is equipped with a device which generates ultrasonic waves of 500,000 cycles per second by means of a titanic acid barium vibrator.

When the fluid is stirred by this vibrator, an infinite number of minute bubbles (called cavitation phenomenon) are formed.

The bubbles collect on the watch part, which are cleaned by the tremendous pressure so generated. SEIKO Auto-cleaner is constructed to generate ultrasonic waves for effective cleaning, and special precautions have been built into the Auto-cleaner for the protection of parts.

2. Cleaning Results

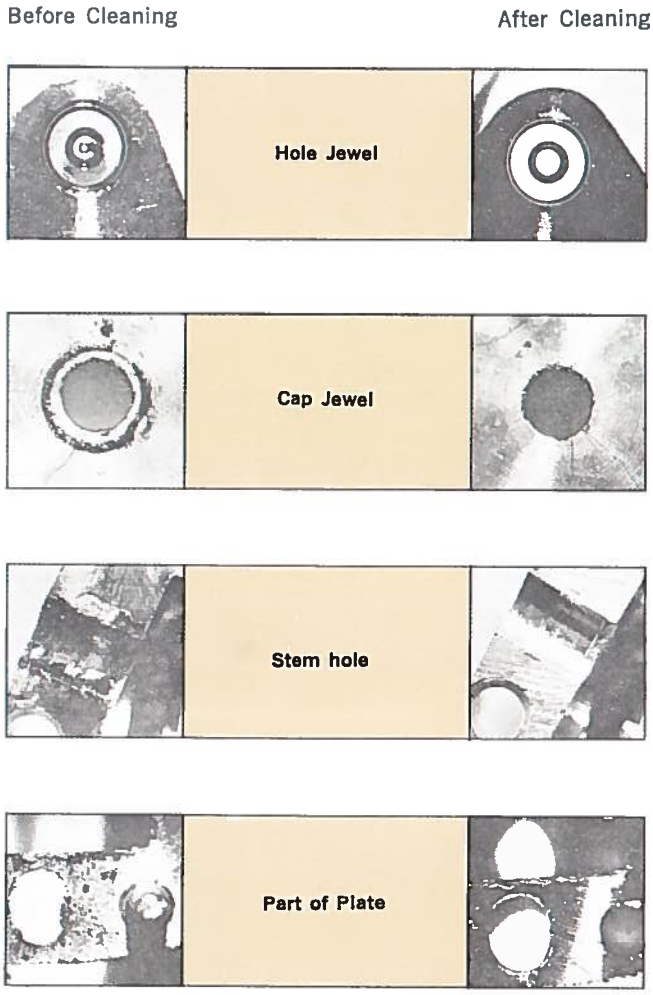
(1) With the fully automatic system cleaning results are uniform.

(2) The construction prevents damaging of cleaned parts.

(3) Parts are cleaned perfectly even in places which cannot be cleaned by conventional machines or manual methods.

(4) With the combined features of ultrasonic, chemical and rotation cleaning, and with superior cleaning solution, the parts are thoroughly cleaned.

(5) Since the cleaning is thorough, the finish is so perfect that it is unnecessary to polish cleaned parts by brush.



3. Cleaning

1) Use of Basket

Release the basket holder on the basket (Fig. 3). By using two baskets, 4 watches can be cleaned. Put the parts into the basket so that their weight will balance (Fig. 4).

This will prevent vibration during rotation.

In order to obtain the best results, place the dirty parts in the lower basket, face down.

In order to prevent the cover of the basket from opening during rotation, always use the attached basket spring. (Fig. 5).

To prevent loss of setting parts, place them in the smallest compartment, or make a small container for them.

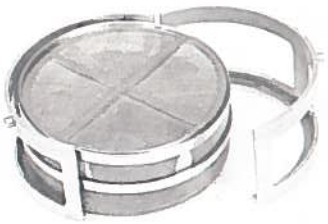


Fig. 3

2) Disassembly of watches

Since the Auto-cleaner maintains a very strong cleaning power, it is not necessary to disassemble watches so completely as on conventional cleaners or manual methods.

It is possible to clean the assembled watch movements, only removing hole jewels and cap jewels of balance.

However, if the watch movements are very dirty, it is advisable to have them completely disassembled for better cleaning.

Be sure to lubricate parts after cleaning.

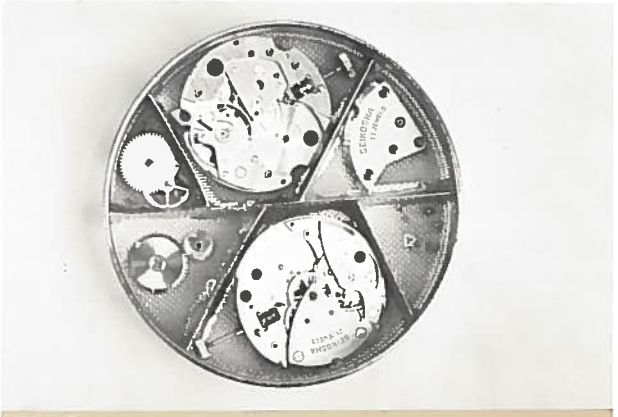


Fig. 4

4. *Watch Cleaning and Rust.*

1) Cause of rust

Warm moist air on cold steel turns into dew and causes rust.

2) How to prevent rust

However moist air may be, so long as moisture on the steel does not turn into dew, it will not cause rust.

After cleaning the parts, therefore, it is necessary to assemble the parts immediately ; if there is sufficient time, parts may be warmed with a light bulb. It is advisable that parts be kept in a container with desiccant.

Fig. 5

3) Use of Anti-Dust and Anti-Humidity container

To prevent dust and humidity, put cleaned parts in the Anti-dust and Anti-humidity Container (1) as shown in Fig. 6.

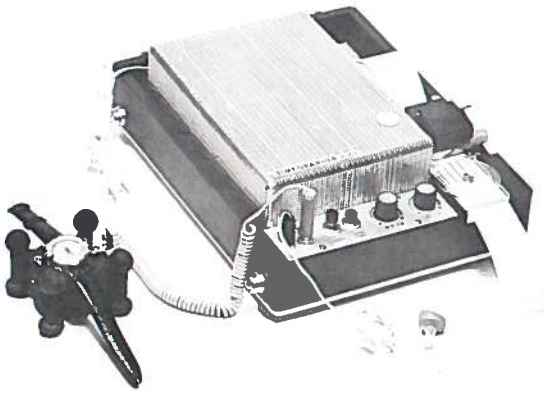
This container is designed to maintain a temperature 5° to 10°C higher than outside.

After cleaning, parts can be placed in this container with a basket (Fig. 7) which will prevent rust and dust.

Fig. 6

Fig. 7

III "SEIKO" Timegrapher

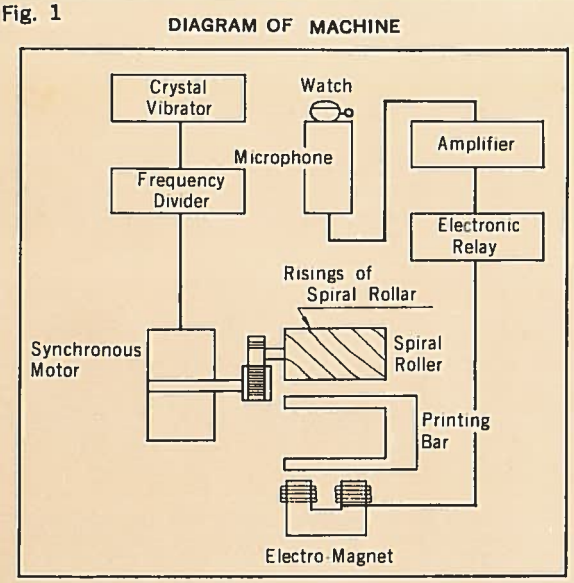


Principle and construction

The use of highly efficient quartz crystal plays an important role in the "TIMEGRAPHER". The exacting signal standard obtained from use of the crystal is compared with the ticks of the watch and the accurate result is recorded.

The frequency of the crystal is 5,280 cycles (5,280 vibrations per second), and reduced to 60 cycles to synchronize with the motor. The motor turns the spiral roller (with 2 projections) at a speed of 15 or 16.5 rev. per second, the desired speed being selected by the crystal selector switch.
The tick of the watch activates the printing bar, which records the difference as compared with the frequency standard time by striking the projection of the spiral roller as in the illustration below. Fig. 1

Fig. 1



Operation

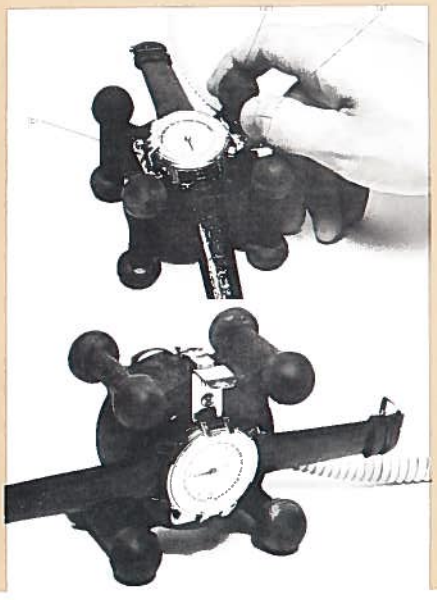
Microphone :

There are generally six different watch positions : dial up, dial down, crown up, crown down, 12-up and 12-down. A microphone should be used at every position for proper testing.

(1) Holding watch :

Pull handle (a) and place the watch firmly between holding plate (a') and oscillating plate (b) as "tick" of the watch is transferred through this plate (b). (Fig. 2)

Fig. 2



(2) Change of position :

A watch can be tested in six different positions by changing positions of microphone. (Fig. 3)

Fig. 3

Earphone :

When using earphone, lift up bar of paper feed and stop the printing sound. Turn knob to right to make tick louder.

The following can be detected with the earphone :

(1) touching of hairspring.
(2) damaged balance staff and jewel hole.
(3) improper meshing of gears of the pallet fork and staff.
(4) touching of balance with hairspring and other parts.
(5) touching of pallet fork and staff and roller table.

The earphone makes possible the detection of troubles never before recognized. These include defects detected in the process of changing the position of the watch, not recorded even on the tape.

Recording :

(1) Principle

The recording paper is fed at a fixed speed by a paper roller ; it enters at the point of contact between the spiral roller and the printing bar. When the beat interval of watch is faster than the fixed speed of the revolution of the roller, the recorded line appears at an inclination towards the right, which means that there is a " gain " in time ; the reverse shows a "loss" of time.

(2) Numbers of Beats

Most watches have 5 beats per second, (though some models now have 5.5 or 6 beats), and can nevertheless be tested by the Timegrapher.

The relationship between numbers of beats and recordings is shown here. .

❶ ***Recordings appearing in one line :***

Numbers of Beats

Per Hour	Per Second
36,000	10
21,600	6
19,800	5.5
18,000	5
12,000	3
5,400	1.5
4,320	1.2
3,600	1.0

❷ ***Recording appearing in two lines :***

Number of beats : 14,400 per hour or 4 per second.

❸ ***Recording will appear like the graph shown below :***

When the vibration of the instrument does not synchronized with the beat, a graph as illustrated will appear on the paper.

For example, proper recording will not appear when 18,000 vibration switch is applied on a watch of 19,800 beats.

In such a case push the other vibration switch so that the vibration will match the beat.

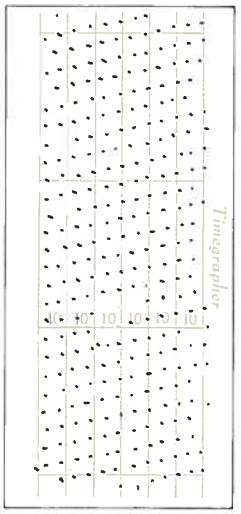


Fig. 4

(3) Recording and Volume Adjusting

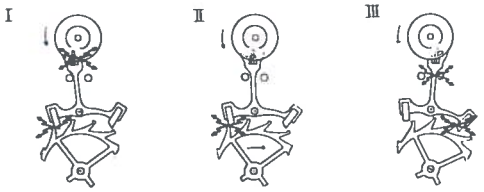
It is most important to take recordings as clear as possible by adjusting the volume. Some watches produce quite different graph lines according to the volume of sound (see graphs below). Watches should be tested where the line of dots is most uniform as graph (c). The appropriate setting may be obtained by turning the volume knob gradually from left to right.

Note: Recordings consist of watch ticks from 3 sections. One of these three may be irregular if the volume switch is not set properly. It is most important to record the 1st sound only, and to make it print clearly.

I and III show sounds coming from two sections of a watch as indicated by the arrows. (Fig. 5)

Three graphs show the recordings when the volume knob is gradually turned towards the right. The graph (c) shows the best recording position. (Fig. 6)

Fig. 5



(4) Adjustment of Striking Sound

If the striking sound is weak, a clear recording cannot be made. To rectify this fault, the striking sound knob should be turned to the right. For stop watches and others with a fast beat, turning the knob to the right will produce a clear recording.

(5) Reading of Measure Plate and Graph Paper

The arrow mark on the square table indicates the daily rate of a watch (gain or loss per 24 hours) when blue lines of measure plate are placed parallel with the recorded lines on the paper. The black figures on the measure plate indicate gains of time and the red figures, losses of time. (Fig. 7)

Fig. 6 (a) (b) (c)

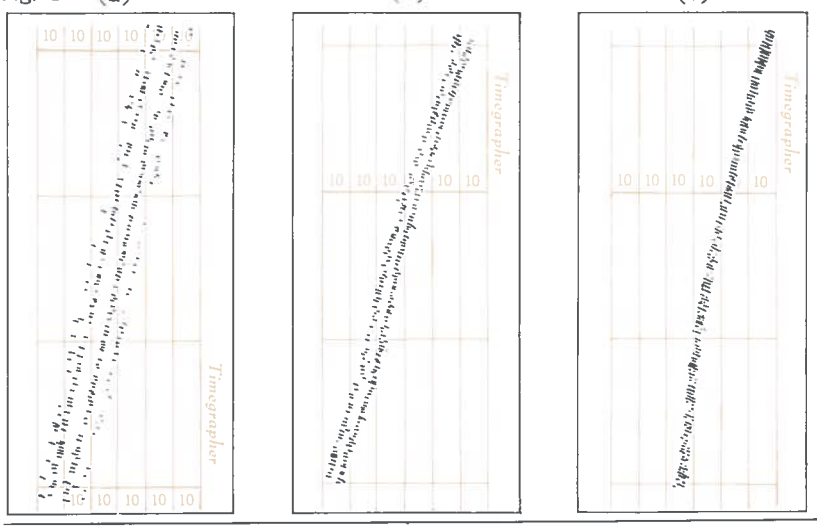
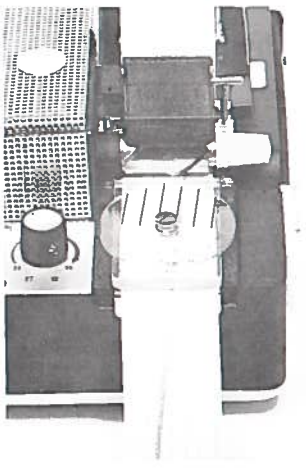


Fig. 7



(6) Instant Reading by Graph Paper

The graph-paper used in this tester can measure gains and losses without the use of a measure plate.

Daily rate can be measured by counting the number of columns on which the dots are printed. Each column represents 10 seconds; three sections separated by horizontal lines represent 24 hours. Examples:

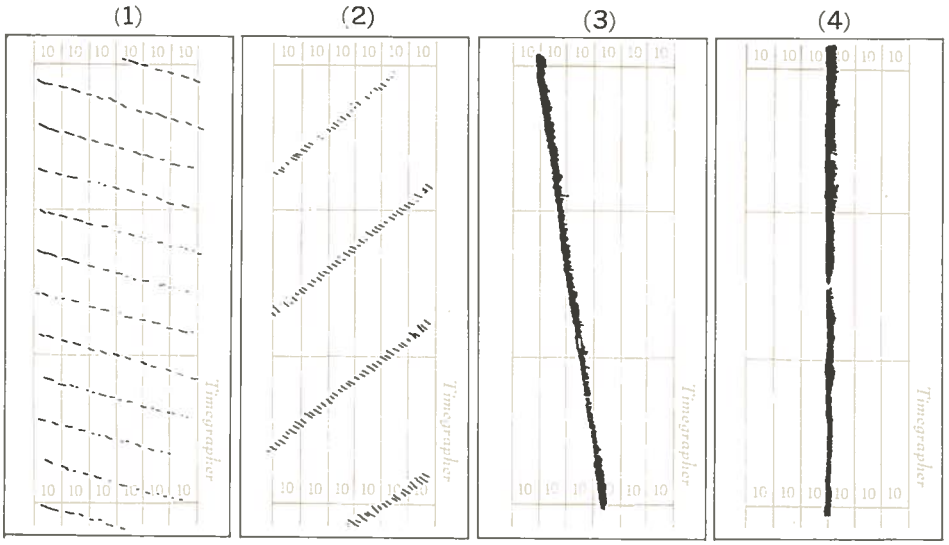


Fig. 8

(1) Loss of 10 min.
(2) Gain of 3 min.
(3) Loss of 30 sec.
(4) No gain, no loss.

How to find defective parts in watches

The following graphs show the condition of watches tested by the Timegrapher.

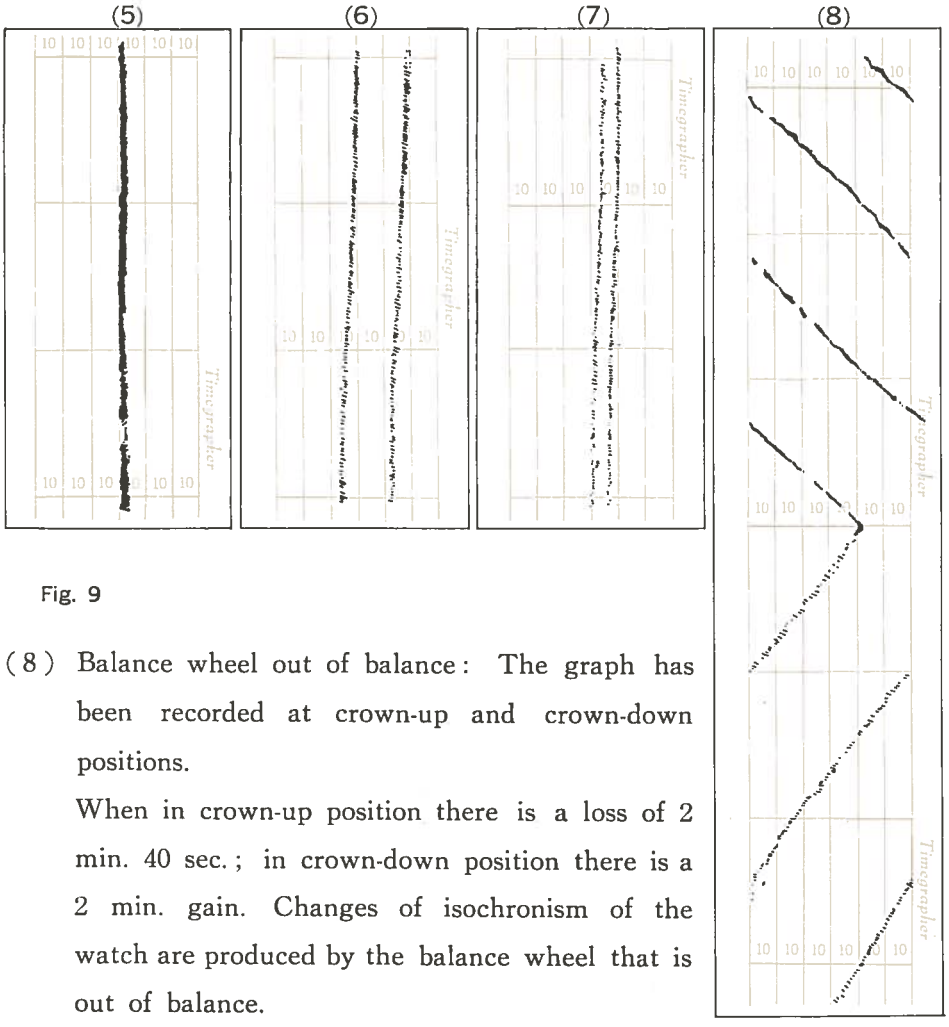


Fig. 9

(5) Accurate time: no gain no loss.

(6) Amplitude (off beat): These two lines show an unbalanced swing of the impulse pin, which will disturb the normal operation of watch and must be corrected.

(7) The space between the two lines of the graph indicates a slightly unbalanced swing of the impulse pin. This may be observed in many watches and is not serious.

(8) Balance wheel out of balance: The graph has been recorded at crown-up and crown-down positions.

When in crown-up position there is a loss of 2 min. 40 sec.; in crown-down position there is a 2 min. gain. Changes of isochronism of the watch are produced by the balance wheel that is out of balance.

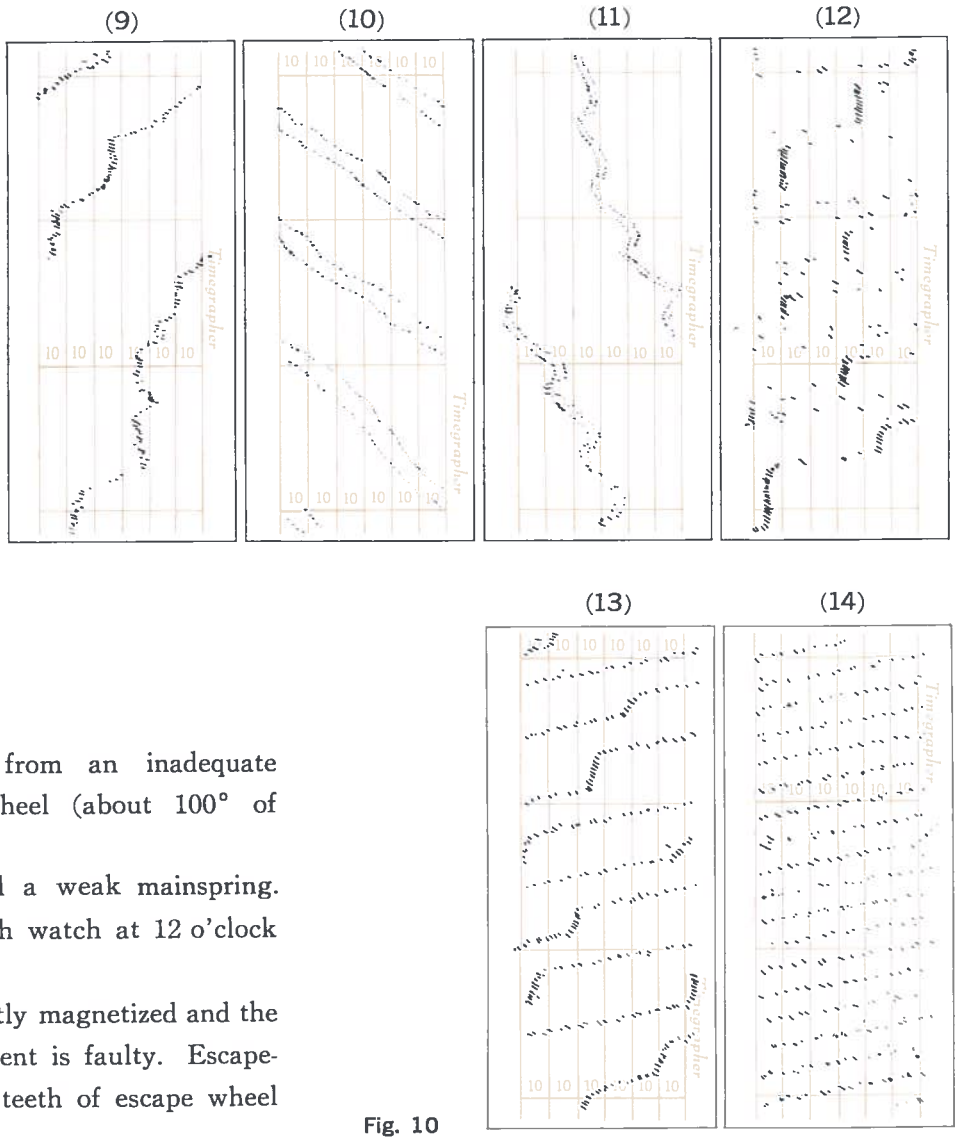


Fig. 10

(9) This recording resulted from an inadequate oscillation of balance wheel (about 100° of oscillation).
This watch has no oil and a weak mainspring.

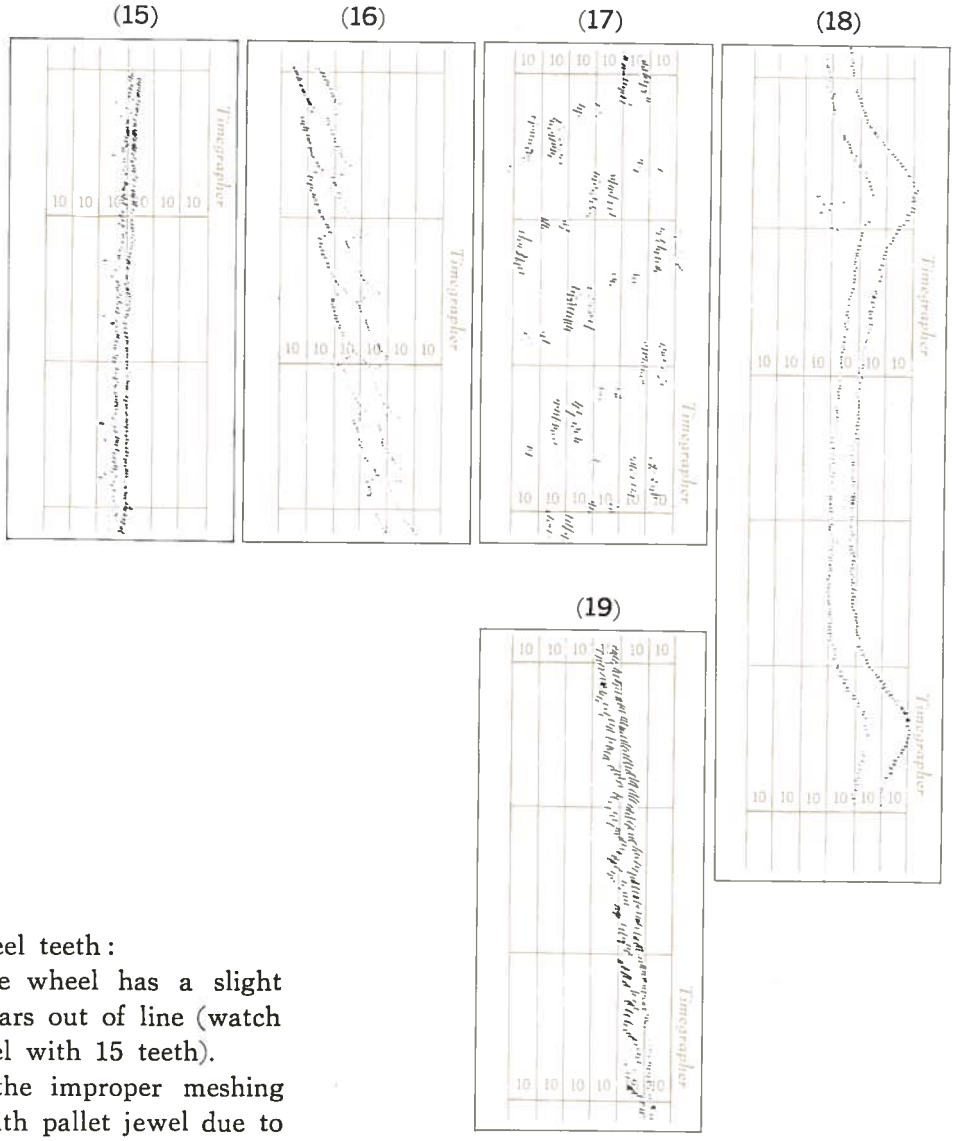
(10) As above (about 90°), with watch at 12 o'clock up position and sticky oil.

(11) This is an old watch slightly magnetized and the graph shows that escapement is faulty. Escape-pivot is worn out, and the teeth of escape wheel are uneven.

(12) Knockings :
Balance wheel is knocking occasionally ; recorded lines are always toward the right.

(13) As knockings become more frequent, they are recorded on the paper and reduce the number of normal recordings.

(14) When knockings become very frequent, recordings appear like those indicating gains of time. In this case sounds of knocking can be clearly audible by earphone.



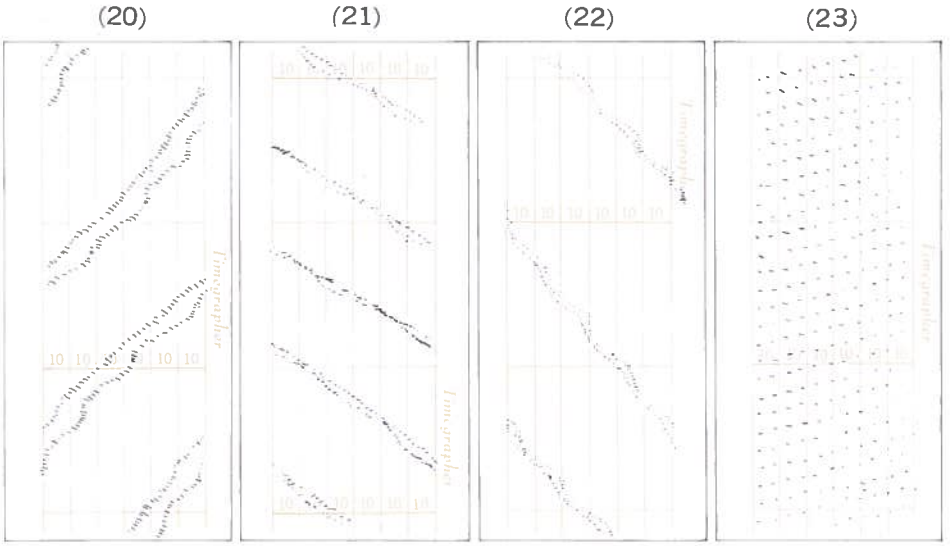
(15) Unevenness of escape wheel teeth :
One of the teeth of escape wheel has a slight defect and one dot appears out of line (watch tested has an escape wheel with 15 teeth).

(16), (17) Recordings indicate the improper meshing of escape wheel teeth with pallet jewel due to unevenness of escape wheel teeth.

(18) Uneveness of 4th wheel teeth :
This shows a sudden change of oscillation of balance wheel caused by touching of second hand with glass once a round ; the same result would appear if teeth of the 4th wheel were uneven.

(19) Condition of banking pins :
This watch loses 10 sec. per 24 hours due to defects in escapement.
The impulse pin is not touching at a fixed period with the pallet fork due to maladjustment of banking pin and escapements.

Fig. 11



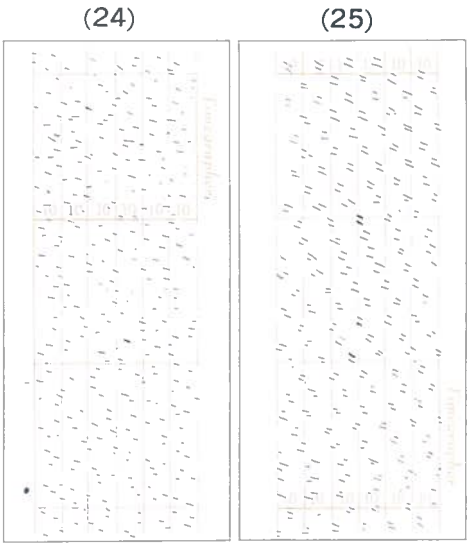


Fig. 12

(20), (21), (22) Magnetized escapements :
These recordings show the influence of magnetized escapements. Recorded lines are apt to swell in irregular waves, similar to those produced by an inadequate oscillation of balance wheel. It is necessary to demagnetize. A scraping sound can be sometimes heard from the hairspring with the use of earphone.

(23) This watch has 5.5 ticks per second, but was not measured with the crystal selector switch at 19,800 beats.
Consequently it shows an unreal gain of time.

(24) Tangling of hairspring : Tangling of hairspring produces these disordered recordings. It can be heard as an irregular sound in the earphone.

(25) Oiled hairspring : This recording resembles one of loss but actually indicates much gain of time due to oil on hairspring. Rapid ticks will be heard in earphone, and recordings are toward the right.

Explanation of representative calibres

1004B (Seiko Angle)

1) Specifications

Casing diameter	15.15 mm × 13.00 mm
Height	4.35 mm
Vibrations per hour	19,800

2) Structure of movement

For this type of watch, an indirect center second system is used: The upper third wheel (which is mounted on the third wheel and pinion) rotates the sweep second pinion, to which the second hand is attached. A friction spring eliminates any backlash of the sweep second pinion.

(Figs. 1 & 2)

3) Disassembly and assembly

See p. 39~p. 44

4) Checking

❶ Space between bands
❷ The crown (by working)
❸ Rotation of the hands
❹ Winding
❺ Positions of hour and minute hands at 12 o'clock
❻ Smoothness of second hand rotation

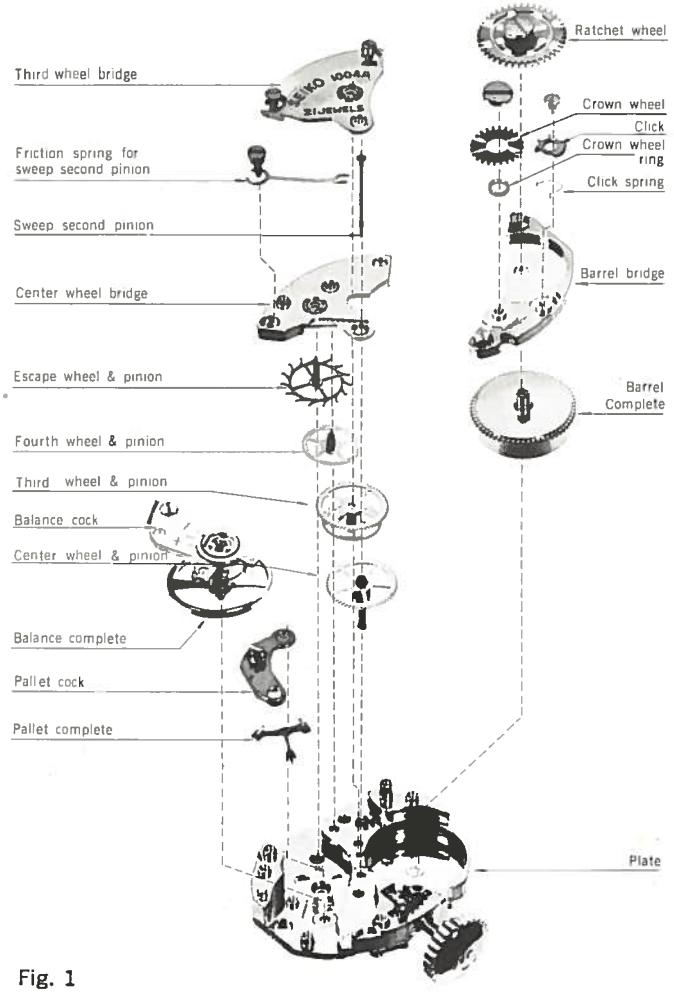


Fig. 1

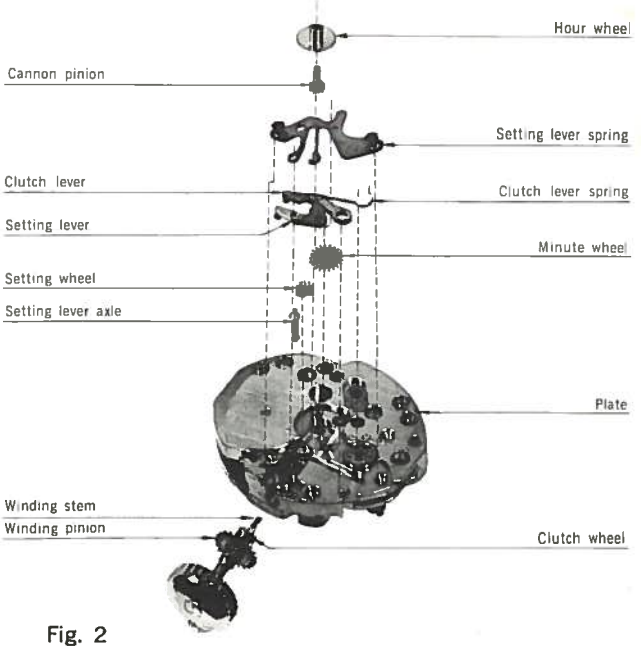


Fig. 2

1004B Disassembly and Assembly

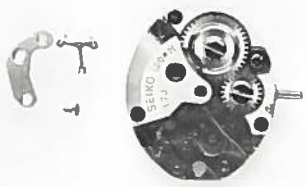
Disassembly

	1 BALANCE COCK	2 DISASSEMBLY OF BALANCE FROM BALANCE COCK	3 UNWINDING OF MAIN SPRING
Method	1) Remove balance cock screw 2) Remove balance cock	1) Turn regulator key with a screw-driver and then remove hair spring 2) Loosen stud screw 3) Remove stud from balance cock	1) First turn ratchet wheel screw to the right with screw-driver briefly 2) Then, disengage click and ratchet wheel from gearing with tweezers, and slowly unwind the spring
Remark		Be careful not to damage hair spring	
Photo			

Assembly

	17 BALANCE COCK	16 ASSEMBLY OF BALANCE ON BALANCE COCK	
Method	1) Set balance cock 2) Fasten balance cock screw 3) Check proper end shake of balance 4) Check the condition of hair spring	1) Set balance on balance cock 2) Turn regulator key, so that hair spring is held 3) Fasten stud screw, so that stud head to be kept above balance cock (in proper position)	
Remark	Check the condition of hairspring carefully		

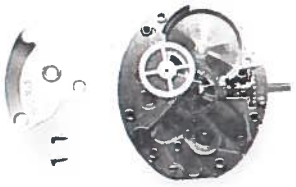
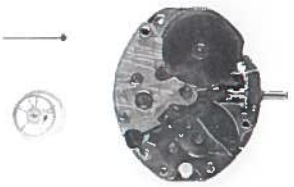
Disassembly

	4 PALLET	5 RATCHET WHEEL	6 BARREL BRIDGE
Method	1) Remove pallet cock screw 2) Remove pallet cock 3) Remove pallet	1) Remove ratchet wheel screw 2) Remove ratchet wheel	1) Remove barrel bridge screws (2 pcs.) 2) Remove barrel bridge 3) Remove barrel complete with arbor
Remark			
Photo			

Assembly

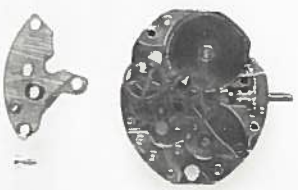
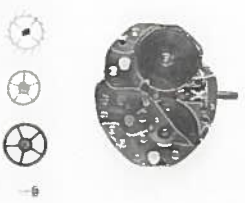
	15 PALLET	14 RATCHET WHEEL	13 BARREL BRIDGE
Method	1) Lubricate pallet jewels (Moebius Chronometers) 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screw 5) Lubricate lower and upper pivots of pallet (Moebius A) 6) Lubricate lower pivot of center wheel and pinion (Moebius A) 7) Set cannon pinion 8) Lubricate lower pivots of third and fourth wheels and pinions	1) Set ratchet wheel 2) Fasten ratchet wheel screw	1) Lubricate upper and lower pivots of barrel complete with arbor (Moebius A) 2) Set barrel complete with arbor 3) Set barrel bridge 4) Fasten barrel bridge screws (2 pcs.)
Remark	Check that pallet pivot has been put in jewel hole, and then fasten bridge screw		

Disassembly

	7 CROWN WHEEL	8 THIRD WHEEL BRIDGE	9 SWEEP SECOND PINION THIRD WHEEL AND PINION
Method	1) Remove crown wheel screw 2) Remove crown wheel 3) Remove crown wheel ring	1) Remove third wheel bridge screws (2 pcs.) 2) Remove third wheel bridge	1) Remove sweep second pinion 2) Remove third wheel and pinion
Remark	Note that only crown wheel ring screw is left-turning		
Photo			

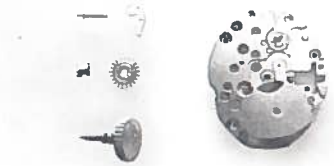
Assembly

	12 CROWN WHEEL	11 THIRD WHEEL BRIDGE	10 SWEEP SECOND PINION, THIRD WHEEL AND PINION
Method	1) Set crown wheel ring 2) Lubricate crown wheel ring (Moebius A) 3) Set crown wheel 4) Fasten crown wheel screw	1) Set third wheel bridge 2) Fasten third wheel bridge screw 3) Lubricate upper pivot of sweep second pinion (Moebius A)	1) Lubricate lower pivot of sweep second pinion (Moebius A) 2) Set sweep second pinion 3) Set third wheel and pinion
Remark		Lubricate upper pivot of sweep second pinion by filling oil sump to 1/4—1/2 of depth	Lubricate with a thin coating

	10 FRICTION SPRING FOR SWEEP SECOND PINION	11 CENTER WHEEL BRIDGE	12 CENTER WHEEL AND PINION, FOURTH WHEEL AND PINION, & ESCAPE WHEEL AND PINION
Disassembly Method	1) Remove friction spring screw (one of center wheel bridge screws) 2) Remove friction spring for sweep second pinion	1) Remove center wheel bridge screw 2) Remove center wheel bridge	1) Remove fourth wheel and pinion 2) Remove escape wheel and pinion 3) Remove cannon pinion 4) Remove center wheel and pinion
Remark			
Photo			

	9 FRICTION SPRING FOR SWEEP SECOND PINION	8 CENTER WHEEL BRIDGE	7 CENTER WHEEL AND PINION, FOURTH WHEEL AND PINION, & ESCAPE WHEEL AND PINION
Assembly Method	1) Set friction spring for sweep second pinion 2) Fasten friction spring screw (one of center wheel bridge screws)	1) Set center wheel bridge 2) Fasten center wheel bridge screw 3) Lubricate upper pivot of fourth wheel and pinion (Moebius A)	1) Lubricate center lower jewel (Moebius A) 2) Set center wheel and pinion. 3) Lubricate upper pivot of center wheel and pinion (Moebius A) 4) Lubricate lower end-piece for for escape wheel and pinion (Moebius A) 5) Set escape wheel and pinion 6) Set fourth wheel and pinion
Remark			Extent of lubrication for lower end-piece of escape wheel and pinion Dia. of cap jewel Max. 2/3 Min. 1/3

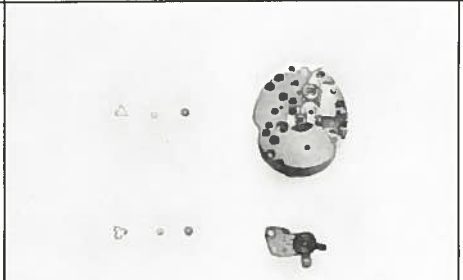
Disassembly

	13 SETTING LEVER SPRING	14 MINUTE WHEEL, SETTING WHEEL AND CLUTCH LEVER	15 WINDING STEM
Method	1) Remove screws for setting lever spring (2 pcs.) 2) Remove setting lever spring	1) Remove minute wheel 2) Remove setting wheel 3) Remove clutch lever spring 4) Remove clutch lever	1) Remove setting lever 2) Remove setting lever axle 3) Remove winding stem 4) Remove clutch wheel 5) Remove winding pinion
Remark			
Photo			

Assembly

	6 SETTING LEVER SPRING	5 MINUTE WHEEL, SETTING WHEEL, AND CLUTCH LEVER	4 WINDING STEM
Method	1) Set setting lever spring 2) Fasten setting lever screws (2 pcs.)	1) Lubricate minute wheel pivot, and setting wheel pin (Moebius A) 2) Set clutch lever 3) Set clutch lever spring 4) Set minute wheel 5) Set clutch lever	1) Set Setting lever axle 2) Set winding pinion 3) Set clutch wheel 4) Lubricate and set winding stem (Moebius A) 5) Set setting lever 6) Lubricate winding pinion and clutch wheel (Moebius A) 7) Lubricate tail end of setting lever (Moebius A)
Remark			

Disassembly

	16 DIAFIX	17 DIA-SHOCK	18 LOWER END-PIECE FOR ESCAPE WHEEL
Method	1) Remove diafix spring 2) Remove cap jewel	1) Remove diashock springs on plate and balance cock 2) Remove hole jewel with frame 3) Remove cap jewel	1) Remove screw of lower end-piece for escape wheel 2) Remove lower end-piece for escape wheel
Remark	No diafix : in this cal. 17 jewels Diafix is re-set as follows : (Fig)	Diashock spring can be removed by turning	
Photo			

Assembly

	3 DIAFIX	2 DIA-SHOCK	1 LOWER END-PIECE FOR ESCAPE WHEEL
Method	1) Insert cap jewel into diafix frame 2) Set diafix spring 3) Lubricate it (Moebius A)	1) Set diashock frame with hole jewel on cap jewel placed with flat surface upward 2) Lubricate it, holding with tweezers (Moebius A) 3) Set diashock frames with dia-shock springs in balance cock and plate	1) Set lower end-piece for escape wheel 2) Fasten screw for lower end-piece of escape wheel
Remark	Extent of lubrication :— Dia. of cap jewels Max. 2/3 Min. 1/3	Extent of lubrication :— Dia. of cap jewels Max. 1/2 Min. 1/3	

2105A (Seikomatic lady calendar)

1) Specifications

Casing diameter
17.80 mm × 15.30 mm
Height 6.55 mm
Vibrations per hour 19,800
Automatic winding
Calendar

2) Automatic winding mechanism

2-1 Development of automatic winding mechanism (Fig. 1)

2-2 Transmission of force in automatic winding mechanism. This mechanism consists mainly of two locking wheels.

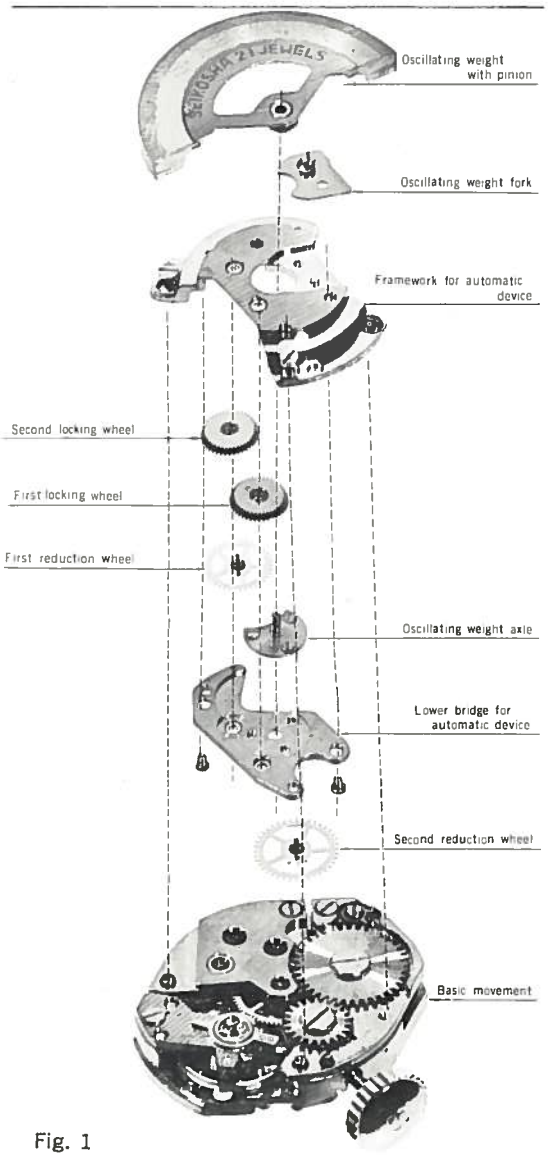


Fig. 1

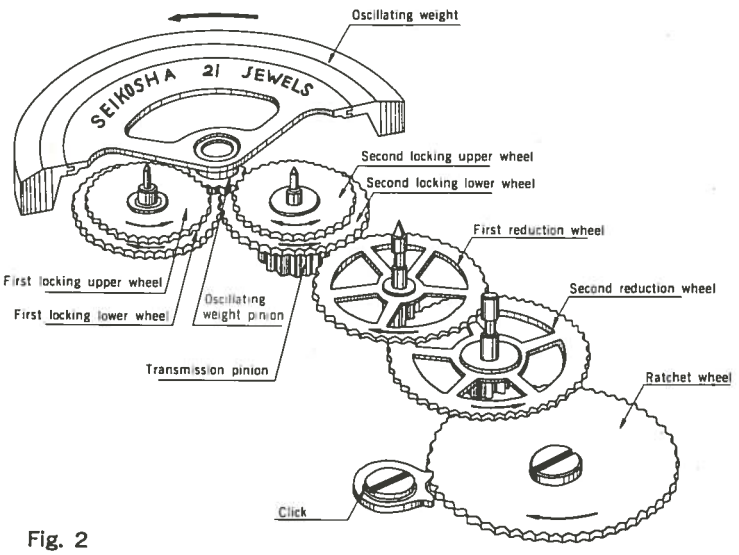


Fig. 2

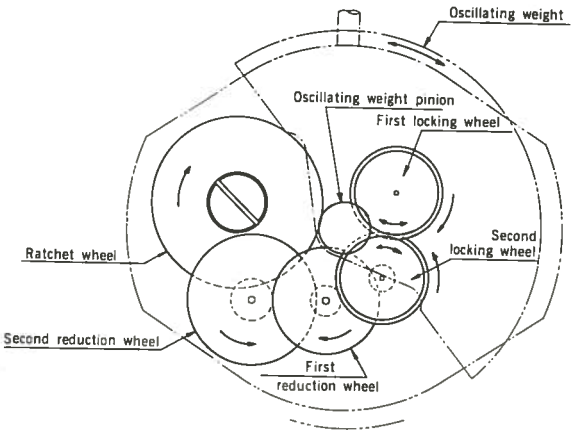


Fig. 3

Torque is transmitted as follows:

Oscillating weight pinion → (First locking wheel) → Second locking wheel → First reduction wheel → Second reduction wheel → Ratchet wheel (see Figs. 2 & 3)

2-3 Action of locking wheels

For the first locking wheel, rotation is transmitted to the lower wheel only when the upper wheel rotates clockwise, while for the second locking wheel, rotation is transmitted to the lower wheel only when the upper wheel rotates counterclockwise. Accordingly, rotation in only one direction is transmitted to the first reduction wheel. (Figs. 4 & 5)

3) Calendar mechanism

3-1 Development of calendar device (Figs. 6 & 7)

3-2 Date driving mechanism
Hour wheel → Intermediate date wheel → Date driving wheel → Date finger → Date dial

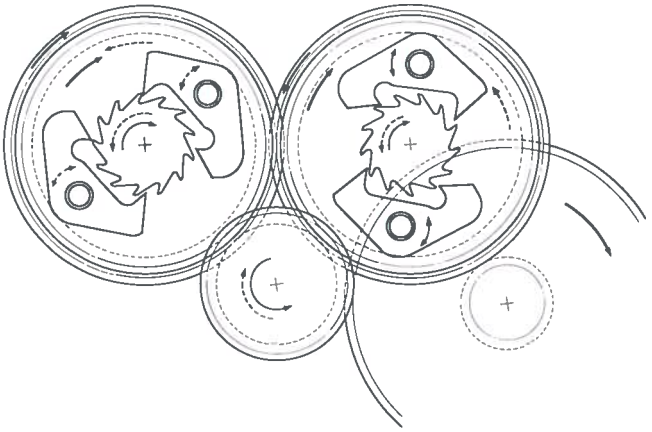


Fig. 5

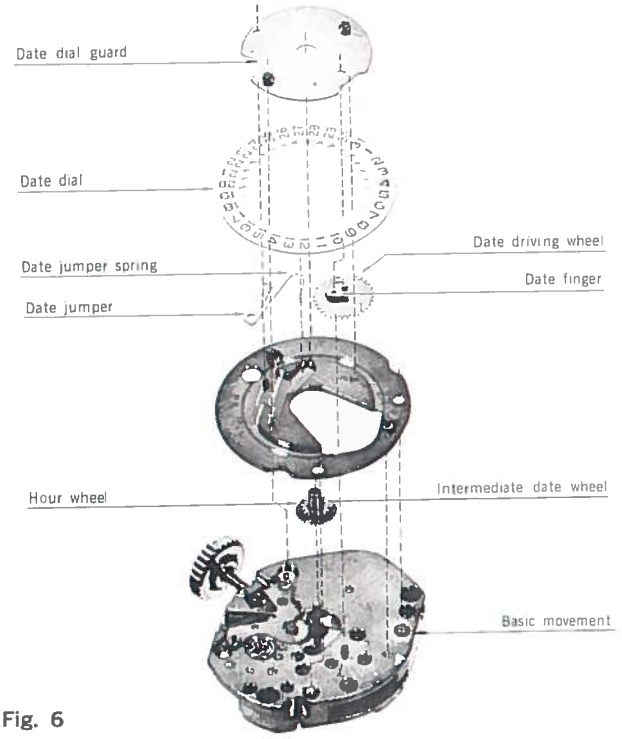


Fig. 6

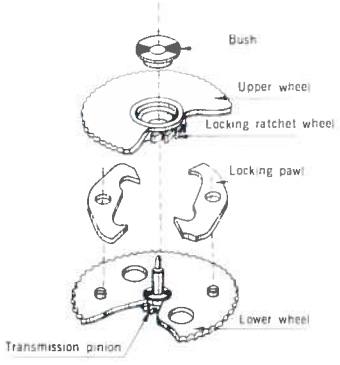


Fig. 4

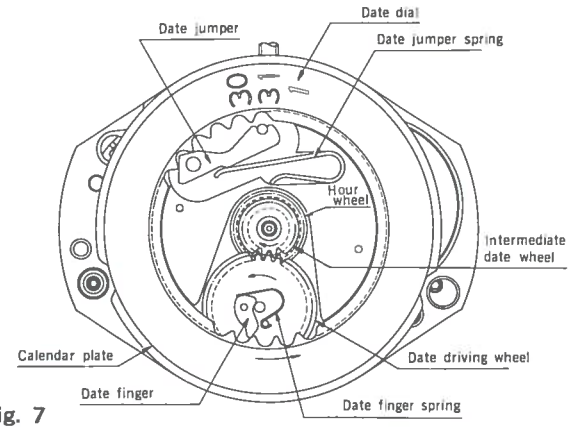


Fig. 7

3–3 Date setting

Pull out the crown, and turn it counter-clockwise from 1 a.m. to 9 p.m. Then turn it clockwise from 9 p.m. to 1 a.m. repeatedly until the correct date is obtained. (Fig. 8)

4) Basic movement (Fig. 9 & 10)

5) Disassembly and assembly
See p. 49~p. 56

6) Checking

1. Space between hands
2. The crown (by working)
3. Rotation of the hands
4. Winding
5. Position of hour and minute hands
6. Date setting
7. Date changes around midnight

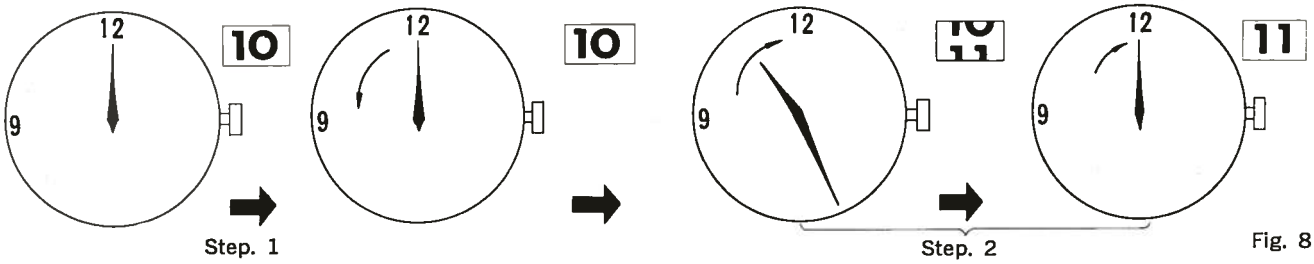


Fig. 8

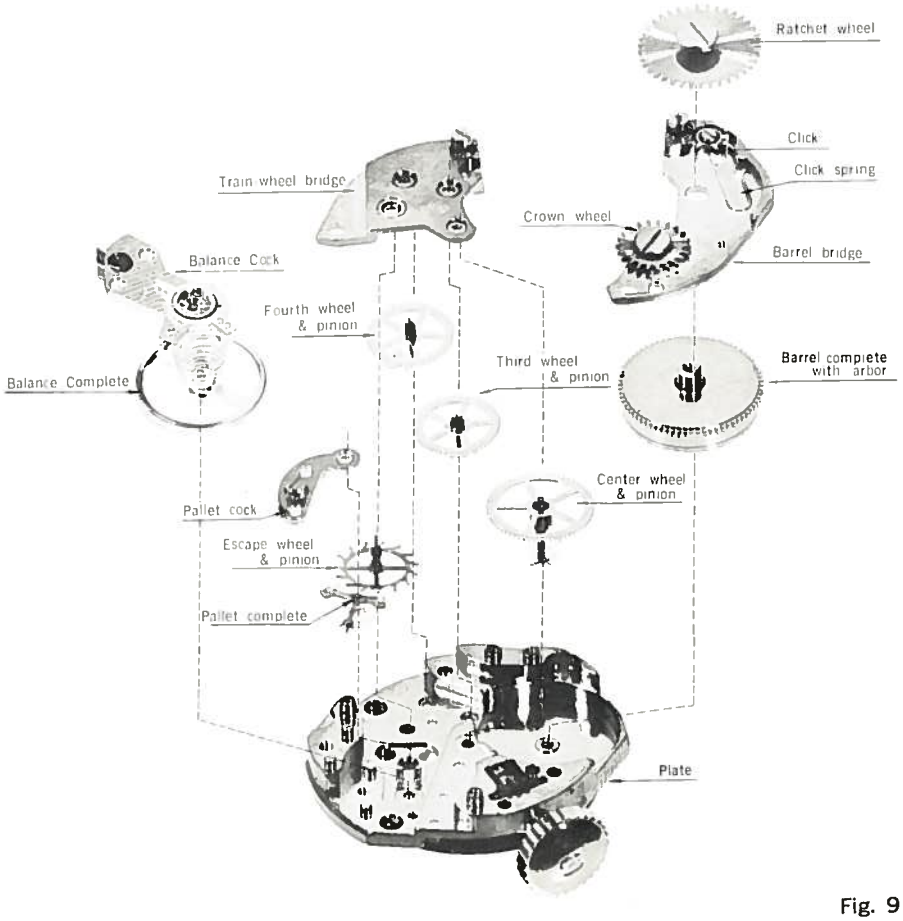


Fig. 9

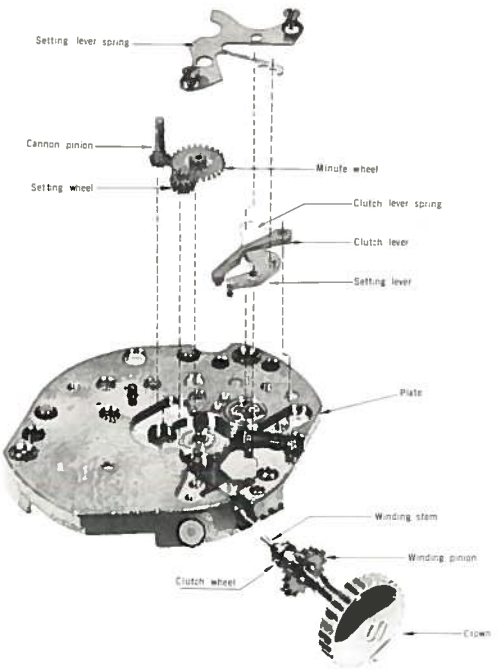
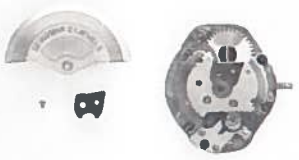


Fig. 10

2105A (Disassembly and Assembly)

Disassembly

		1 OSCILLATING WEIGHT	
Method		1) Remove screw for oscillating weight fork 2) Remove oscillating weight fork 3) Remove oscillating weight	
Remark		Remove oscillating weight by lifting it out perpendicularly	
Photo			

Assembly

24 CONFIRMATION OF MOTION OF OSCILLATING WEIGHT	23 OSCILLATING WEIGHT FORK	22 OSCILLATING WEIGHT
Method: 1) Carefully turn ratchet wheel more than 7 times by crown 2) Leave the watch untouched for more than one hour 3) Place the movement perpendicular, and carefully turn it	1) Lubricate that part of oscillating weight fork which touches the oscillating weight (Moebius A) 2) Set oscillating weight fork on framework for automatic device 3) Fasten screw for oscillating weight fork 4) Check end shake of oscillating weight	1) Lubricate oscillating weight axle (Moebius A) 2) Set oscillating weight
Remark: Oscillating weight must not rotate with movement. If it returns to its place by its own weight, it is placed properly Carry out this test by rotating both clockwise and counterclockwise.	Lubricate oscillating weight fork by coating with a small quantity of oil	Lubricate oscillating weight axle with an ample quantity of oil

Disassembly

	2 FRAMEWORK FOR AUTOMATIC DEVICE	3 SECOND REDUCTION WHEEL	4 LOWER BRIDGE FOR AUTOMATIC DEVICE
Method	1) Remove framework screws (2 pcs. near balance cock) of automatic device and also framework screw of automatic device (short, 1pc. near ratchet wheel) 2) Remove framework	1) Remove second reduction wheel	1) Remove lower bridge screws (2 pcs.) 2) Remove lower bridge from framework
Remark		Be careful in removing not to bend the pivot, which is a long piece	
Photo			

Assembly

	21 FRAMEWORK FOR AUTOMATIC DEVICE	20 LUBRICATION OF FIRST AND SECOND REDUCTION WHEELS, LOWER PART	19 LOWER BRIDGE OF AUTOMATIC DEVICE
Method	1) Set framework 2) Fasten framework screws (2pcs. near balance cock) and short screw (1 pce. near ratchet wheel)	1) Lubricate upper pivot of second reduction wheel (Moebius A) 2) Set second reduction wheel 3) Lubricate lower surface of first and second reduction wheels (Moebius A)	1) Set lower bridge of automatic device on framework 2) Fasten lower bridge screws (2 pcs.) 3) Check end shake of first reduction wheel
Remark	Check end shake of first and second locking wheels	Lubricate pivot thinly, so that oil does not flow In lubricating the lower surface, take care that oil does not reach teeth of pinion	Assembly must be on a table with holes, on which framework is placed with oscillating weight axle in a hole

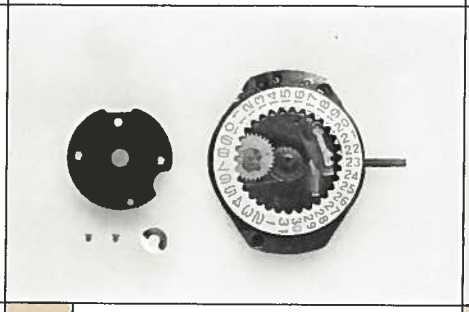
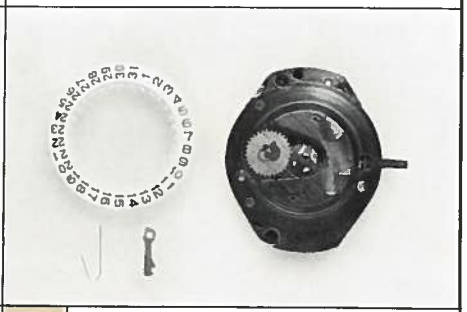
Disassembly

	5 FIRST AND SECOND LOCKING WHEELS		6 OSCILLATING WEIGHT AXLE
Method	1) Remove first reduction wheel 2) Remove first and second locking wheels		1) Remove screws of oscillating weight axle (3 pcs.) 2) Remove oscillating weight axle
Remark	Be careful in removing not to bend the first reduction wheel pivot, which is a long piece		Oscillating weight axle need not be removed unless it is faulty After cleaned, parts of automatic mechanism (including center wheel bridge) must be treated with Epilame
Photo			

Assembly

	18 FIRST REDUCTION WHEEL	17 LUBRICATION OF FIRST AND SECOND LOCKING WHEELS	16 OSCILLATING WEIGHT AXLE
Method	1) Set first locking wheel on framework for automatic device 2) Set second locking wheel on framework 3) Lubricate pivot of first reduction wheel (Moebius A) 4) Set first reduction wheel on framework	1) Lubricate bushes of first and second locking wheels (Moebius A) 2) Lubricate pivots of first and second locking wheels (Moebius A)	1) Set oscillating weight axle on lower bridge of automatic device 2) Fasten oscillating weight axle screws (3 pcs.)
Remark	Lubricate pivot thinly so that oil does not flow	Oil used for bush must be kept to a minimum, so that it does not touch locking pawl Lubricate pivot with a thin coating of oil. Note that lubrication must precede assembly	

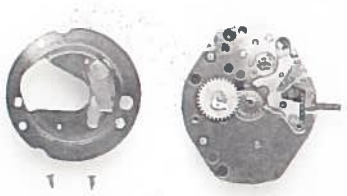
Disassembly

		7 DATE DIAL GUARD	8 DATE DIAL
Method		1) Remove date dial guard screws (2 pcs.) 2) Remove date dial guard 3) Remove dial washer	1) Remove date dial 2) Remove date jumper 3) Remove date jumper spring
Remark			
Photo			

Assembly

	15 CHECK OF FIRST AND SECOND LOCKING WHEELS	14 DATE DIAL GUARD	13 DATE JUMPER
Method	1) Check first locking wheel for unlock when counter clockwise rotation 2) Check second locking wheel for unlock when clockwise rotation 3) Check end shake of first and second upper locking wheels	1) Set dial washer on hour wheel 2) Set date dial guard 3) Fasten date dial guard screws (2 pcs.) 4) Check the operation of date dial	1) Set date jumper spring 2) Set date dial 3) Lubricate date jumper (Moebius A) 4) Set date jumper
Remark	Check turning by holding pinion with tweezers and rotating upper wheel If turning is smooth, parts and assembly are in order		Lubricate thinly that part of date jumper which touches the date dial

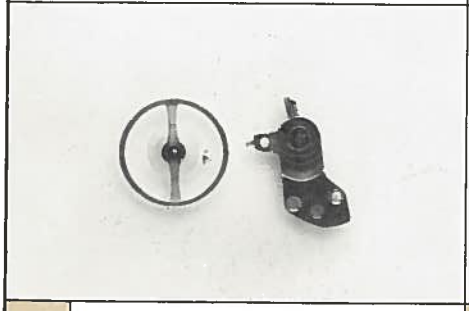
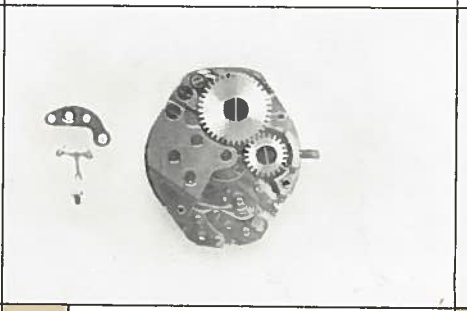
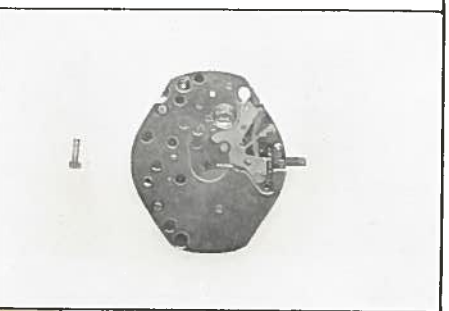
Disassembly

	9 CALENDAR PLATE	10 DATE DRIVING WHEEL	11 BALANCE COCK
Method	1) Remove screws of calendar plate (2 pcs.) 2) Remove calendar plate	1) Remove date finger 2) Remove date driving wheel 3) Remove hour wheel	1) Unwind main spring 2) Remove balance cock screw 3) Remove balance cock
Remark			As there is only one screw for barrel bridge, unwinding main spring by pressing on barrel bridge
Photo			

Assembly

	12 CALENDAR PLATE	11 DATE FINGER	10 BALANCE COCK
Method	1) Set calendar plate 2) Fasten calendar plate screws (2 pcs.)	1) Set hour wheel 2) Lubricate date driving wheel pin (Moebius A) 3) Set date driving wheel 4) Set date finger on date driving wheel pin	1) Set balance cock 2) Fasten balance cock screw 3) Confirm proper end shake of balance 4) Check the condition of hair spring
Remark			

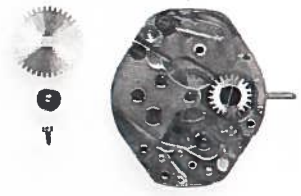
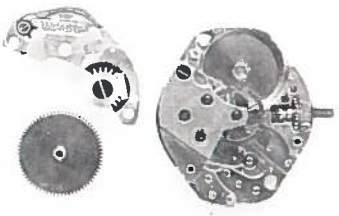
Disassembly

	12 DISASSEMBLY OF BALANCE FROM BALANCE COCK	13 PALLET	14 CANNON PINION
Method	1) Turn regulator key with a screw driver and then remove hair spring 2) By loosing stud screw, remove stud and balance	1) Remove pallet screw 2) Remove pallet cock 3) Remove pallet	1) Remove cannon pinion
Remark			
Photo			

Assembly

	9 BALANCE COMPLETE WITH STUD	8 PALLET	7 CANNON PINION
Method	1) Check hair spring 2) Set balance on balance cock 3) Turn regulator key, so that hair spring is held 4) Fasten stud screw, so that stud head to be kept above balance cock (in proper position)	1) Lubricate pallet jewels (Moebius Chronometers) 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screw	1) Lubricate lower pivot of center wheel and pinion (Moebius A) 2) Set cannon pinion
Remark		Check end shake of pallet	In setting cannon pinion, take care to mesh teeth with those of minute wheel

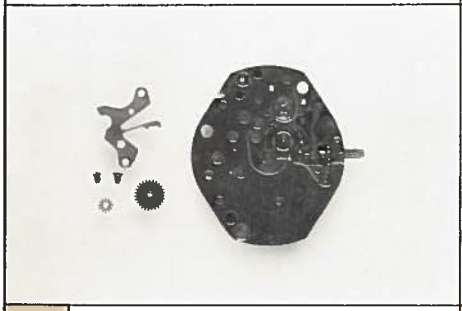
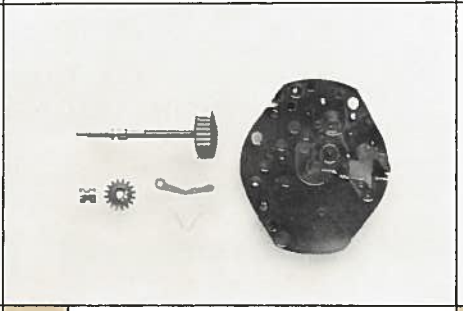
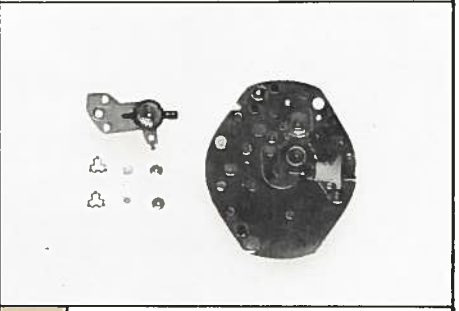
Disassembly

	15 RATCHET WHEEL	16 BARREL	17 TRAIN WHEELS
Method	1) Remove ratchet wheel screw 2) Remove ratchet wheel 3) Remove barrel bridge screw	1) Remove barrel bridge 2) Remove barrel complete with arbor	1) Remove train wheel bridge screw 2) Remove train wheel bridge 3) Remove forth wheel and pinion, escape wheel and pinion, third wheel and pinion, and center wheel and pinion
Remark			
Photo			

Assembly

	6 RATCHET WHEEL	5 BARREL BRIDGE	4 TRAIN WHEELS
Method	1) Fasten barrel bridge screw near center wheel bridge 2) Set ratchet wheel 3) Fasten ratchet wheel screw	1) Lubricate upper and lower pivots of barrel complete (Moebius A) 2) Set barrel 3) Lubricate crown wheel ring (Moebius A) 4) Set barrel bridge	1) Set in the following order : a) Escape wheel and pinion b) Fourth wheel and pinion c) Third wheel and pinion d) Center wheel and pinion 2) Set train wheel bridge 3) Fasten train wheel bridge screw, near third wheel and pinion 4) Lubricate pivots of center pinion upper, third pinion upper and lower, fourth pinion upper and lower, and escape pinion upper and lower. (Moebius A)
Remark			Make sure that train wheels rotate smoothly before fastening bridge screw Check end shake of each wheel and pinion

Disassembly

	18 MINUTE WHEEL	19 CLUTCH LEVER	20 DIA-SHOCK
Method	1) Remove setting lever spring screws (2 pcs.) 2) Remove setting lever spring 3) Remove setting wheel, and minute wheel	1) Remove clutch lever spring 2) Remove clutch lever	1) Remove diashock spring 2) Remove hole jewel with frame
Remark			Of the upper and lower diashock jewels, the lower is thinner
Photo			

Assembly

	3 SETTING LEVER SPRING	2 CLUTCH LEVER	1 DIA-SHOCK FRAME
Method	1) Set setting wheel 2) Set minute wheel 3) Set setting lever spring 4) Fasten screws (2 pcs.) of setting lever spring	1) Lubricate winding stem, clutch wheel, winding pinion, clutch lever pin, setting lever axle, setting wheel axle, minute wheel axle, and setting lever pin (Moebius A) 2) Set clutch lever 3) Set clutch lever spring	1) Set diashock frame with hole jewel on cap jewel placed with flat surface upward 2) Lubricate it, holding with a tweezers. (Moebius A) 3) Set diashock frames with diashock spring in balance cock and plate
Remark	Pull the stem out and push it in, to check its smoothness		Note that the lower of the two diashock cap jewels is thinner

2505A (Seikomatic Lady Calendar)

1. Specifications

Casing diameter	17.20mm
Height	5.35mm
Vibrations per hour	19,800
Automatic winding with sweep second	
Calendar	

2. Autmatic winding and Calendar mechanisms

Refer to (quite same to) Cal. 2105A

3. Basic movement

3-1 *Characteristics*

In this calibre, the power transmission mechanism is somewhat different from that of center second and indirect center second systems, developed newly and specially by Seiko.

3-2 *Transmission of force*

Torque is transmitted as follows,
Barrel → Center wheel and pinion → 3rd pinion → Upper 3rd wheel→Sweep second pinion→Lower 3rd wheel→4th wheel and pinion→Escape wheel and pinion.

3-3 *Mechanism of 3rd wheel and pinion*

As shown in Fig. 1, 3rd wheel seat is fixed to 3rd pinion, and lower 3rd wheel is then mounted.
There is a spacer between lower 3rd wheel and upper 3rd wheel in order to avoid friction.

Upper 3rd wheel is fastened to 3rd pinion, making one body with 3rd pinion; in revolving, lower 3rd wheel is free.

Accordingly, 3rd pinion and upper 3rd wheel are driven as one body by center wheel and pinion, and upper 3rd wheel rotates sweep second pinion.

Sweep second pinion also drives lower 3rd wheel, which in turn rotates 4th wheel wheel and pinion.

This mechanism makes "friction spring for sweep second pinion" unnecessary, which is used in indirect center second system, and makes it posible to convey the toque stably.

In regard to others of basic movement in this calibre, refer to Cal. 1004B.

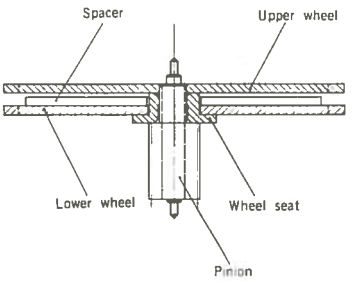


Fig. 1. The 3rd wheel and pinion

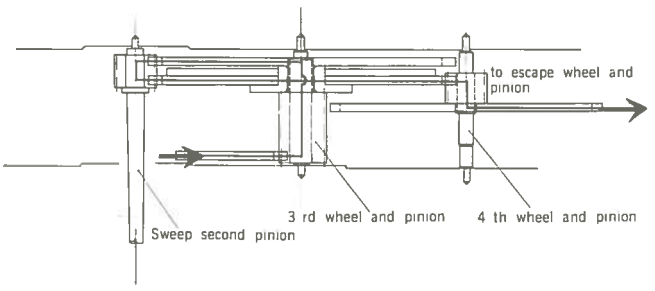


Fig. 2. Transmission of force

5719A (Seiko Crown Chronograph)

1 Specifications

Casing diameter	27.60 mm.
Height	6.13 mm
Vibrations per hour	18,000
Chronograph	

2 Structure of outer parts

2-1 *Development of outer parts* (Fig. 1)

2-2 *Bezel*

A tension-ring fits the glass tightly in the case to maintain waterproofing.

The rotating bezel on the case permits reading of time elapsed. (Fig. 2)

Note : Since the rotating bezel is made of plastic, keep away from benzine, thinners, trichlorethylene, and heat.

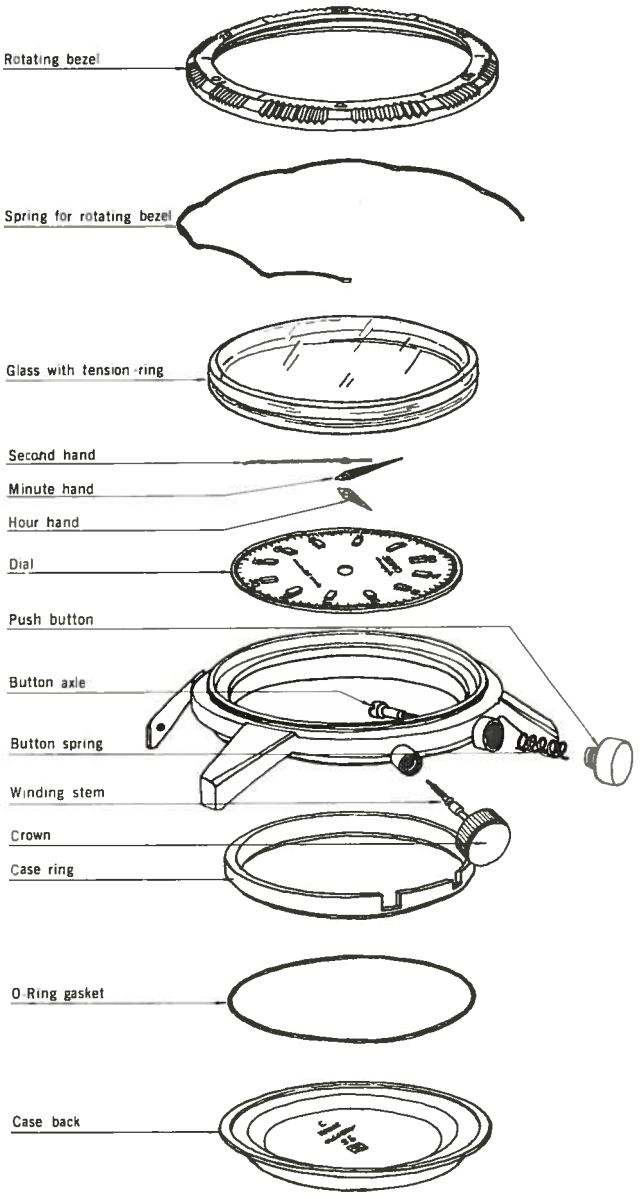


Fig. 1

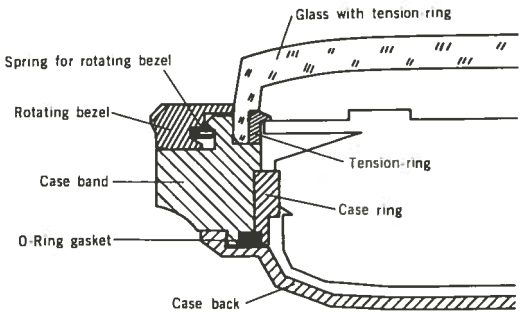


Fig. 2

2–3 Chronograph button

The button and button stem are coupled by a screw. When the button stem actuates the operating lever, a stopwatch system is set in motion.

A gasket used in this section assures waterproofiing. Fig. 3

3 Chronograph

3–1 *Development of the chronograph mechanism*

Fig. 4

3–2 *Action of chronograph*

Barrel → Center wheel → Third wheel
→ Fourth wheel → Escapement → Balance
→ {Chronograph Fourth wheel} → {Coupling wheel} → {Chronograph wheel}

Fig. 6

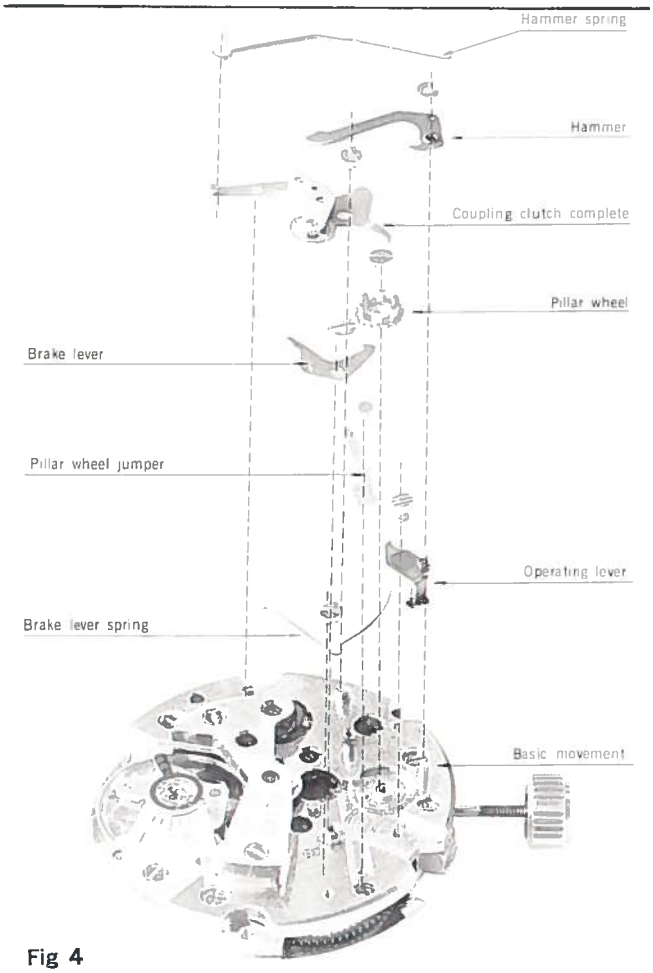


Fig 4

Fig. 5

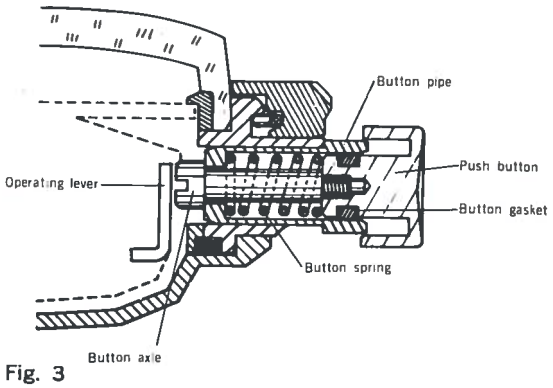


Fig. 3

Transmission route of force

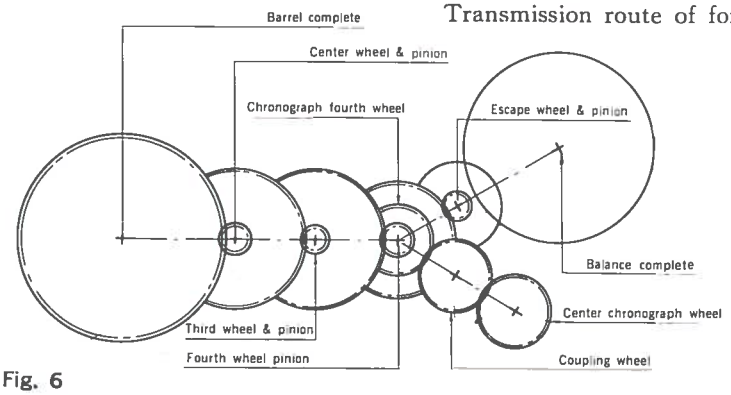


Fig. 6

Start, lock and return of the sweep second hand act as follows:

❶ Start

When the operating lever is pushed as shown in Fig. 7, one column of the pillar wheel is driven and each lever moves to the position shown in Fig. 8. As one end of the hammer contacts the column of the pillar wheel, the other end moves off the heart-cam.

When the hammer moves off the heart-cam, the coupling wheel lever drops between columns. The coupling wheel then engages the chronograph wheel, which starts the second hand.

(The coupling wheel's eccentric pin adjusts the proper engagement between coupling and chronograph wheels.)

❷ Lock

By pushing the operating lever as shown in Fig. 8, the starting position of the wheel moves to the position shown in Fig. 9.

As the coupling wheel lever contacts the column, the coupling wheel is disengaged from the chronograph wheel.

One end of the brake lever then drops between columns and the other end grips the chronograph wheel, locking the second hand.

❸ Return

When the operating lever is pushed again as shown in Fig. 9, the overall status is restored to that of Fig. 7. The brake lever contacts the column and the chorono-graph wheel is disengaged.

The hammer then drops between columns and the strikes the heart-cam, which returns the second hand to the 0 position.

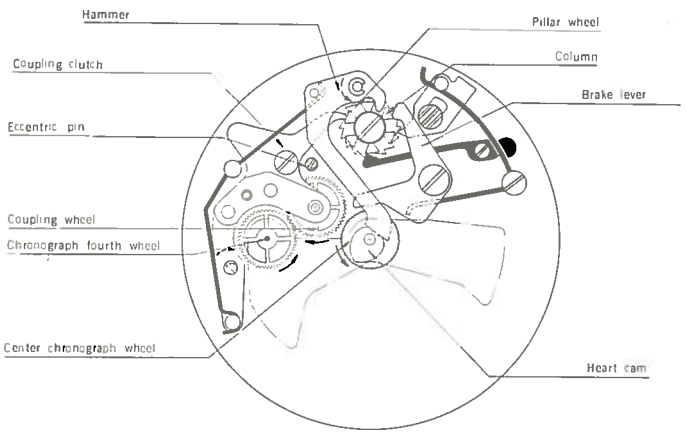


Fig. 7

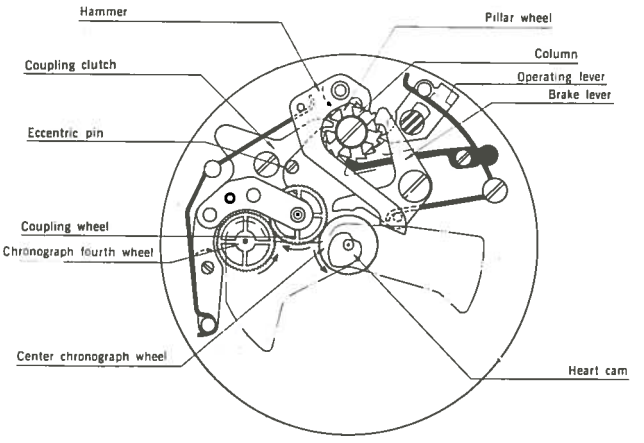


Fig. 8

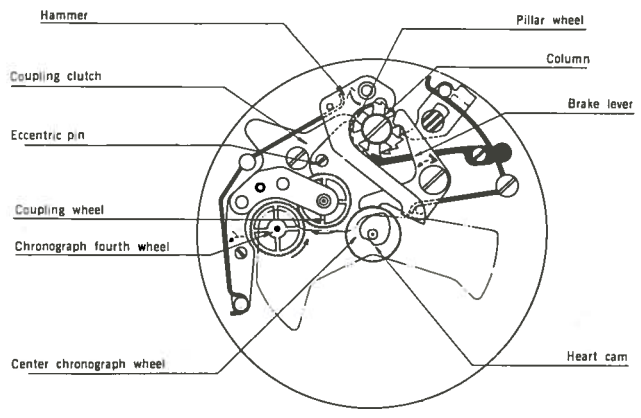


Fig. 9

4 Basic Movement
(Fig. 10)

5 Mainspring winding mechanism

Since the chronograph system is installed on the barrel & train-wheel bridge, the mainspring mechanism is different from other watches.

In this mechanism, the click placed under the barrel & train-wheel bridge locks the crown wheel instead of the ratchet wheel. For easy un-winding of the mainspring, the end of the click protrudes from the bridge. (Fig. 11)

6 Adjustment of the coupling wheel engagement

The coupling wheel, located between the chronograph fourth wheel and chronograph wheel starts or stops the transmission of torque. Make sure these three wheels engage each other properly to prevent the second hand's jumping and stopping and the reduction of balance amplitude.

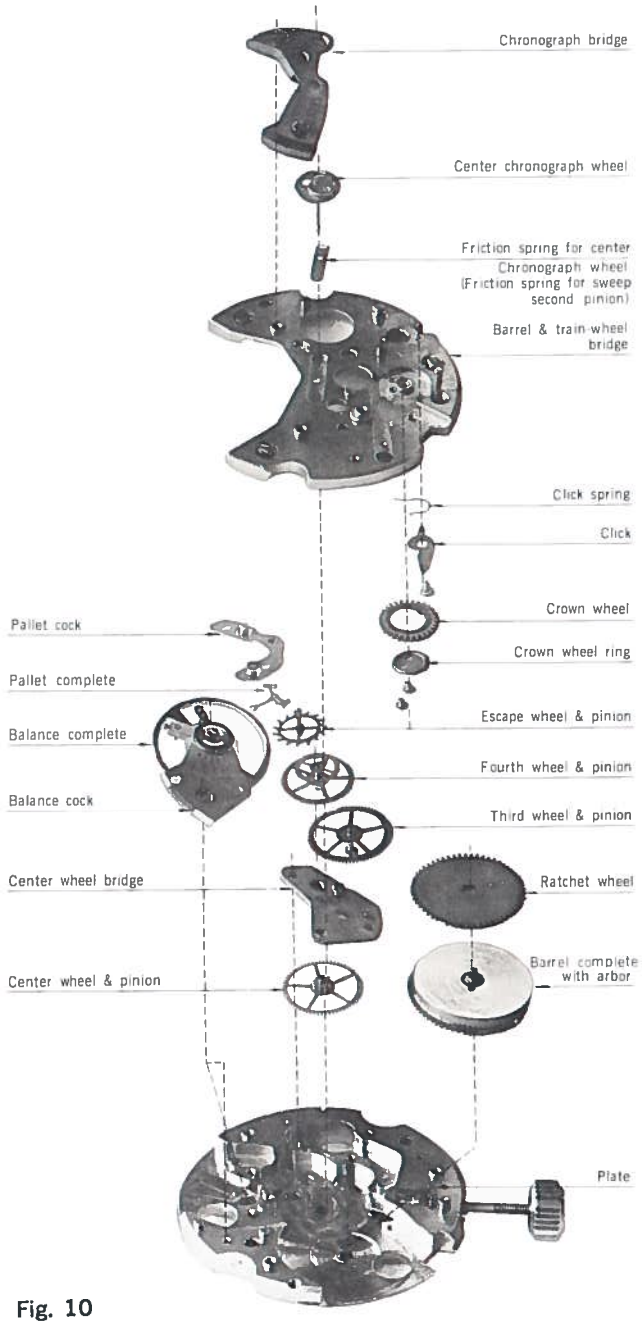


Fig. 10

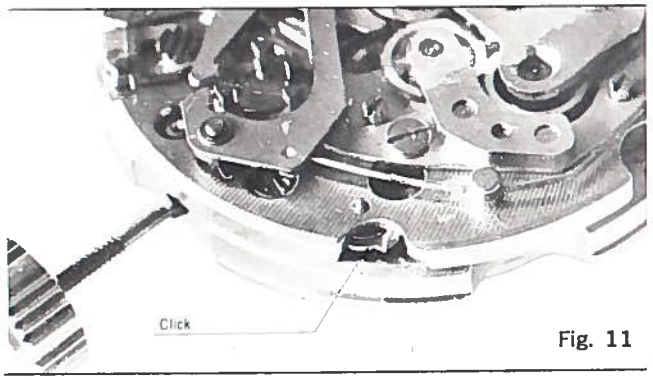


Fig. 11

6-1) *Checking*

***a*) Engagement of the chronograph fourth wheel and the coupling wheel.**

More than 2/3 of the coupling wheel teeth should mesh with the chronograph fourth wheel. Amplitude of balance in this condition should be more than 180°. (Fig. 12)

***b*) Engagement between the coupling wheel and the center chronograph wheel.**

1/6-4/6 of the coupling wheel teeth should mesh with the chronograph wheel, and the balance amplitude in this condition should be more than 180°. (Check the amplitude in several rotations of the chronograph wheel.) (Fig. 13)

6-2 *Adjustment*

***a*) Engagement between the chronograph fourth wheel and the coupling wheel.**

Place the second hand at the returned position and engage the chronograph fourth wheel and the coupling wheel to their greatest extent by turning the A pin (eccentric pin). Then gradually disengage the two wheels by releasing the A pin until a balance amplitude of more than 180° is obtained.

(Check the engagement during more than one rotation of the coupling wheel.)

***b*) Engagement between the coupling wheel and the chronograph wheel.**

While the second hand is moving, adjust the engagement of the two wheels by turning the B pin (eccentric pin).

(Check the engagement in several rotations of the coupling wheel.) (Fig. 14)

***c*) Engagement of the three wheels.**

While the second hand is moving, check the engagement of the three wheels. If they are not properly geared, readjust by turning the eccentric pins.

7 Disassembly and Assembly

See p. 65~p. 71

8) Checking

1. Space between hands
2. Start, lock, and return
3. Position of second-hand when returned
4. Action of chronograph
5. The crown (by working)
6. Rotation of bezel
7. Positions of hour and minute hands at 12 o'clock
8. Gasket placement
9. Waterproof tests

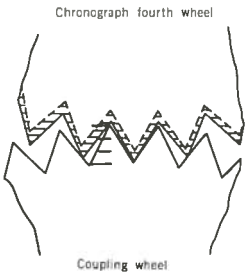


Fig. 12

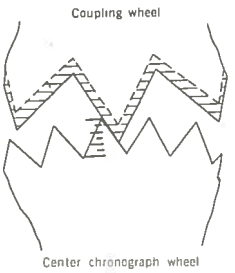


Fig. 13

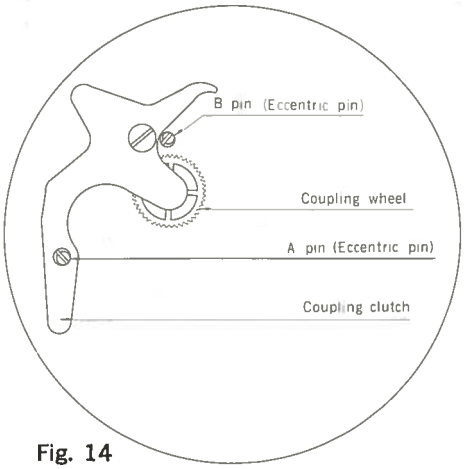
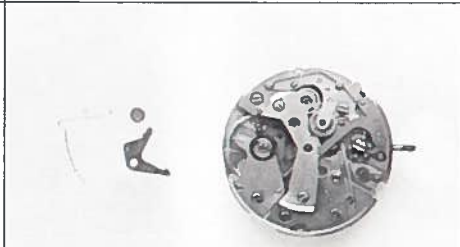
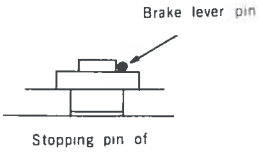
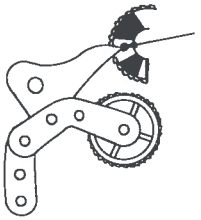
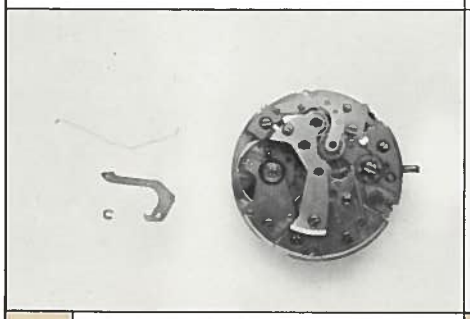
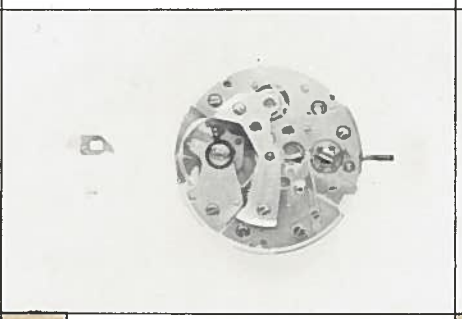
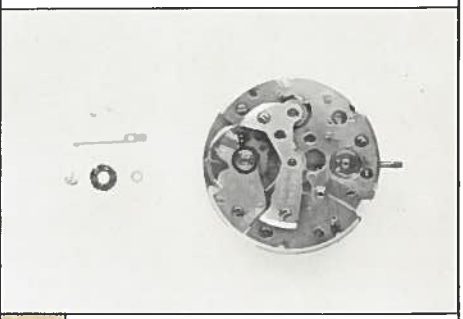


Fig. 14

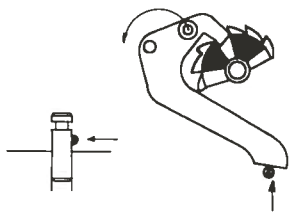
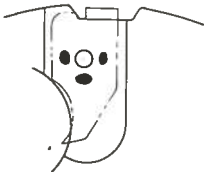
5719A (Disassembly and Assembly of chronograph mechanism)

Disassembly		**1 BRAKE LEVER**	**2 COUPLING CLUTCH**
	Method	1) Remove brake lever spring 2) Remove brake lever spring screw 3) Remove brake lever screw 4) Remove brake lever	1) Remove coupling clutch screw 2) Remove coupling clutch
	Remark		It is not necessary to remove coupling wheel
	Photo		
Assembly		**19 ADJUSTMENT OF GEARING OF COUPLING WHEEL**	**18 BRAKE LEVER**	**17 COUPLING CLUTCH**
	Method	1) Check engagement of chronograph fourth wheel and coupling wheel 2) Check engagement of coupling wheel and center chronograph wheel 3) Check that starting, stopping and returning of second hand are in order (Refer to "Adjustment of coupling wheel engagement")	1) Fasten brake lever spring screw 2) Set brake lever 3) Fasten brake lever screw 4) Check that there is proper end-shake 5) Lubricate brake lever and stopping pin of operating lever spring 6) Set brake lever spring 7) Check operation of brake lever	1) Lubricate upper and lower pivot holes for coupling wheel and coupling clutch 2) Set coupling clutch 3) Check end-shake and looseners of coupling clutch
	Remark	Check engagement of chronograph fourth wheel—coupling wheel—center chronograph wheel.	Lubrication : Moebius A 	Lubrication : Moebius A 

Disassemdly

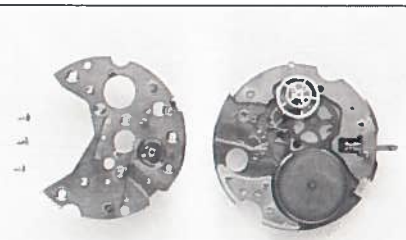
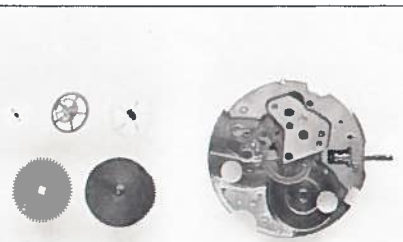
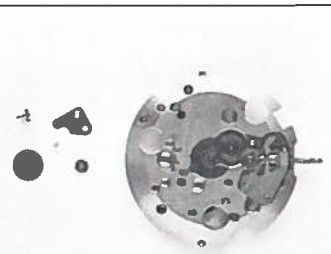
	3 HAMMER	4 OPERATING LEVER	5 PILLAR WHEEL
Method	1) Remove hammer spring 2) Remove snap for hammer 3) Remove hammer	1) Remove operating lever screw 2) Remove operating lever	1) Remove pillar wheel jumper screw 2) Remove pillar wheel jumper 3) Remove pillar wheel screw 4) Remove pillar wheel 5) Remove pillar wheel ring
Remark	Be careful that snap for hammer does not spring off	Note that operating lever screw is a left hand screw	
Photo			

Assembly

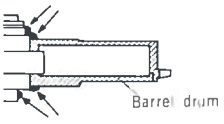
	16 HAMMER	15 OPERATING LEVER	14 PILLAR WHEEL
Method	1) Lubricate hammer pin and hammer 2) Set hammer 3) Set snap for hammer 4) Check operation of hammer	1) Lubricate operating lever on the side facing plate 2) Set operating lever 3) Fasten operating lever screw 4) Check end-shake and loose setting	1) Set pillar wheel ring 2) Lubricate pillar wheel ring and barrel & train-wheel bridge 3) Set pillar wheel 4) Fasten pillar wheel screw 5) Check rotation of pillar wheel 6) Set pillar wheel jumper 7) Fasten pillar wheel jumper screw 8) Lubricate pillar wheel jumper
Remark	Lubrication : Moebius A 	Lubrication : Moebius grease Remontior 	Lubrication : Moebius A 

5719A Disassembly and Assembly of chronograph mechanism—*continued*

Disassembly

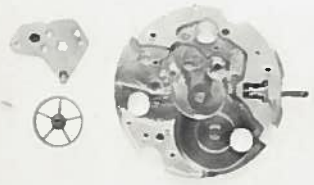
	12 BARREL AND TRAIN WHEEL BRIDGE	13 TRAIN WHEELS	14 CANNON PINION
Method	1) Loosen and remove barrel & train-wheel bridge screws (3) 2) Remove barrel & train-wheel bridge	1) Remove fourth, third and escape wheels and pinions 2) Remove ratchet wheel and barrel	1) Remove cannon pinion 2) Loosen and remove minute wheel bridge screw 3) Remove minute wheel bridge and minute wheel 4) Remove setting wheel
Remark	Take care not to touch chronograph fourth wheel with the bridge		
Photo			

Assembly

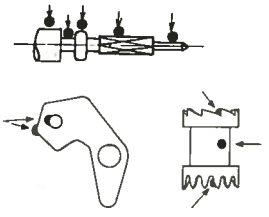
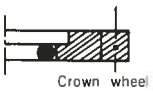
	7 BARREL AND TRAIN WHEEL BRIDGE	6 TRAIN WHEELS	5 MINUTE WHEEL AND CANNON PINION
Method	1) Set barrel & train wheel bridge 2) Insert pivots into respective hole jewels 3) Fasten barrel & train wheel bridge screws (3)	1) Lubricate barrel arbor 2) Set barrel complete 3) Set ratchet wheel 4) Replace escape wheel & pinion 5) Lubricate lower jewel for third wheel and set third wheel & pinion 6) Lubricate sweep second wheel pinion 7) Set fourth wheel & pinion	1) Lubricate minute wheel pin and setting wheel pin 2) Set minute wheel and setting wheel 3) Set minute wheel bridge and fasten bridge screw 4) Set cannon pinion
Remark		Lubrication 	

5719A Disassembly and Assembly of chronograph mechanism—*continued*

Disassembly

	15 CENTER WHEEL BRIDGE	16 CLUTCH LEVER AND SETTING LEVER	17 CROWN WHEEL AND CLICK
Method	1) Loosen and remove center wheel bridge screw 2) Remove center wheel bridge and center wheel & pinion	1) Loosen setting lever spring screw and remove setting lever spring 2) Remove clutch lever spring, clutch lever, setting lever and setting lever axle 3) Pull out crown and remove clutch wheel and winding pinion	1) Loosen and remove crown wheel ring screws (2) 2) Remove crown wheel ring 3) Remove crown wheel 4) Loosen and remove click screw 5) Remove click and click spring
Remark			
Photos			

Assembly

	4 CENTER WHEEL BRIDGE	3 CLUTCH LEVER AND SETTING LEVER	2 CROWN WHEEL AND CLICK
Method	1) Lubricate center wheel pinion 2) Set center wheel & pinion 3) Set center wheel bridge 4) Fasten center wheel bridge screw	1) Lubricate winding stem, clutch wheel and setting lever 2) Set clutch wheel, winding pinion and winding stem 3) Set setting lever axle and setting lever 4) Set clutch lever, clutch lever spring and setting lever spring 5) Fasten setting lever spring screw 6) Check operation by pulling out and pushing in crown	1) Lubricate crown wheel 2) Set crown wheel 3) Set crown wheel ring and fasten crown wheel ring screws (2) 4) Set click spring and click 5) Fatsen click screw 6) Check operation of click and crown wheel
Remark		Lubrication 	Lubrication  Crown wheel

Disassembly

	18 DIAFIX	19 CLEANING
Method	1) Remove diafix springs from plate and barrel & train-wheel bridge 2) Remove cap jewels 3) Clean them in benzine, trichlorethylene, etc.	1) Clean all parts so far disassembled. (For further details refer to "cleaning".)
Remark	Cleaning liquid should be newly opened Cleaning should be done with a brush	
Photo		

Assembly

	1 DIAFIX	
Method	1) Insert cap jewels into diafix frames into plate and barrel & train wheel bridge 2) Set diafix springs 3) Lubricate cap jewels (Moebius A) Max. 1/2 dia. Min. 1/3 dia.	
Remark		

6218A (Seikomatic Weekdater)

1. Specifications

Casing diameter	27.60 mm
Height	5.60 mm
Vibrations per hour	18,000
Automatic winding	
with sweep second	
Calendar (day and date)	
Second-setting device	

2. Automatic winding mechanism

2-1. *Development of automatic winding* Fig. 1

2-2. *Transmission of force in automatic winding mechanism*

This automatic winding mechanism is the most simplified on the market; it consists mainly of the pawl lever and the transmission wheel.

The oscillating weight is rotated by slight movements of the arm, and its rotating torque is transmitted to the pawl lever through the eccentric pin fixed on the ball-bearing.

The pawl lever moves the transmission wheel gears into the ratchet wheel, the mainspring is wound. Fig. 2

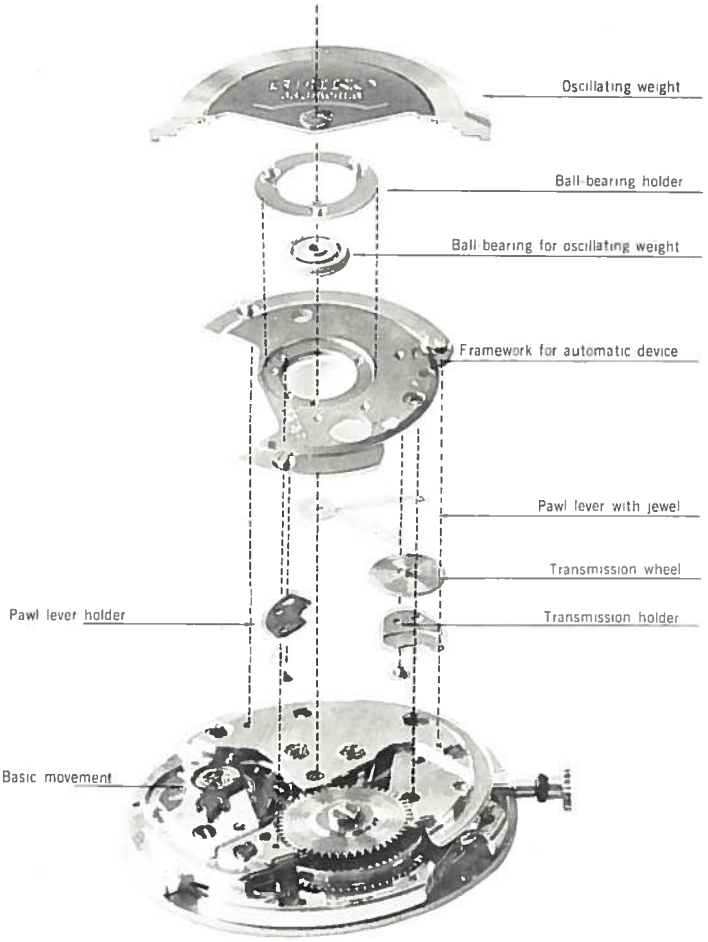


Fig 1

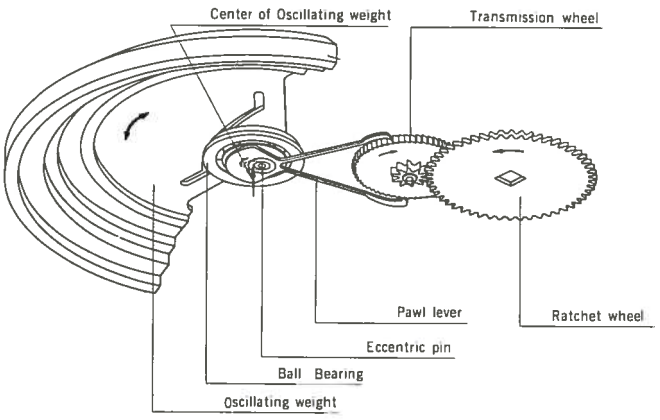


Fig. 2

3. Calendar mechanism

3–*1.* *Development of calendar device*

Fig. 3

3–*2.* *Mechanism of calendar device*

1*) *Date driving mechanism

The torque is transmitted as follows:
Hour wheel→Intermediate date wheel→
Day & date driving wheel→Date finger→
Date dial

2*) *Day driving mechanism

Day & date driving wheel→Day finger →Day star with dial disk

Fig. 4

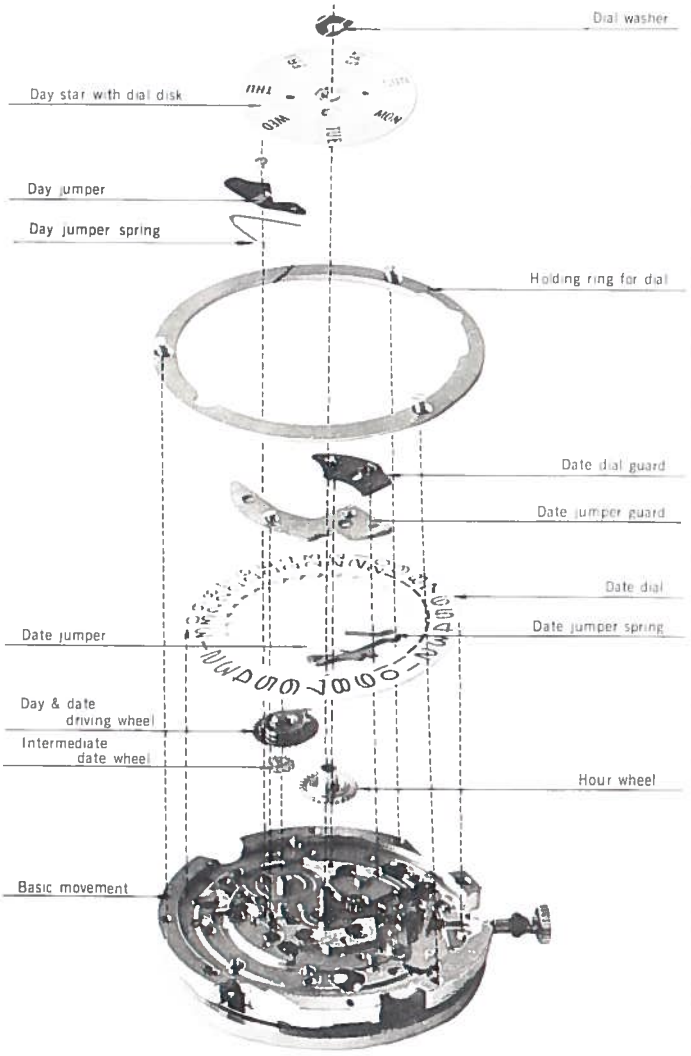


Fig. 3

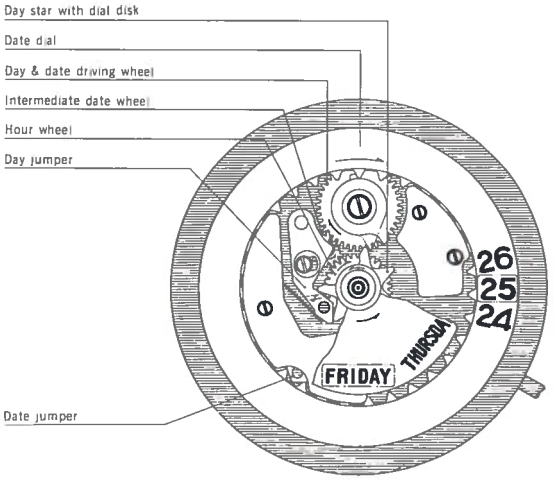


Fig. 4

3–3. *Day setting*

Pull the crown first to the third position and turn the crown counter-clockwise from 1 a.m. to 10 p.m. then turn it clockwise from 10 p.m. to 1 a.m.; repeatedly until the correct day is obtained. Fig. 5

3–4. *Date setting*

Pull the crown to its second position.. Turn clockwise or counter-clockwise, advancing or reversing the calendar date. Fig. 6

At the third position set the hands at the desired time.

Return the crown to its original position.

Note: Date setting cannot be done from 8 p.m. to 1 a.m.

4. Second-setting device

When the crown is pulled out to the third position, the sweep second hand stops because the second-setting lever locks the sweep second wheel. Fig. 7

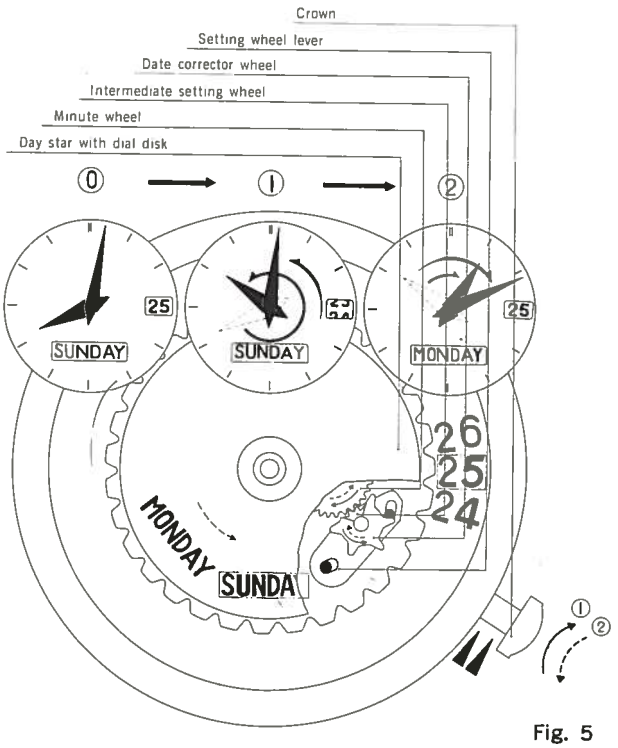


Fig. 5

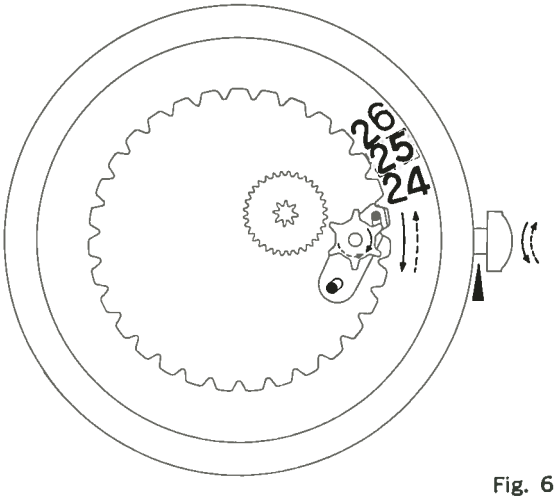


Fig. 6

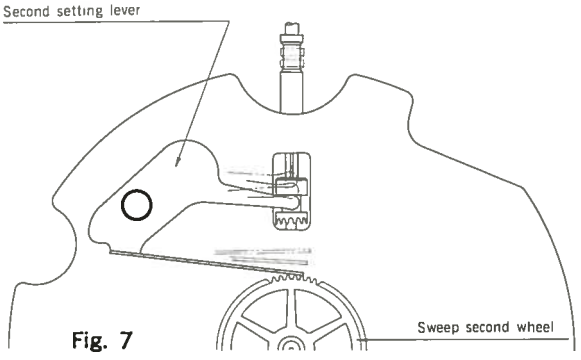


Fig. 7

5. Basic movement

Fig. 8, 9.

6. Disassemly and assembly

See p. 76～p. 84

7. Checking

(1) Space between hands

(2) The crown (by working)

(3) Rotation of hands

(4) Day and date setting

(5) Date changes near midnight; day changes at 1 a.m.

(6) Positions of hour and minute hands at 12 o'clock

(7) Second-setting device

(8) Gasket placement

(9) Waterproof tests

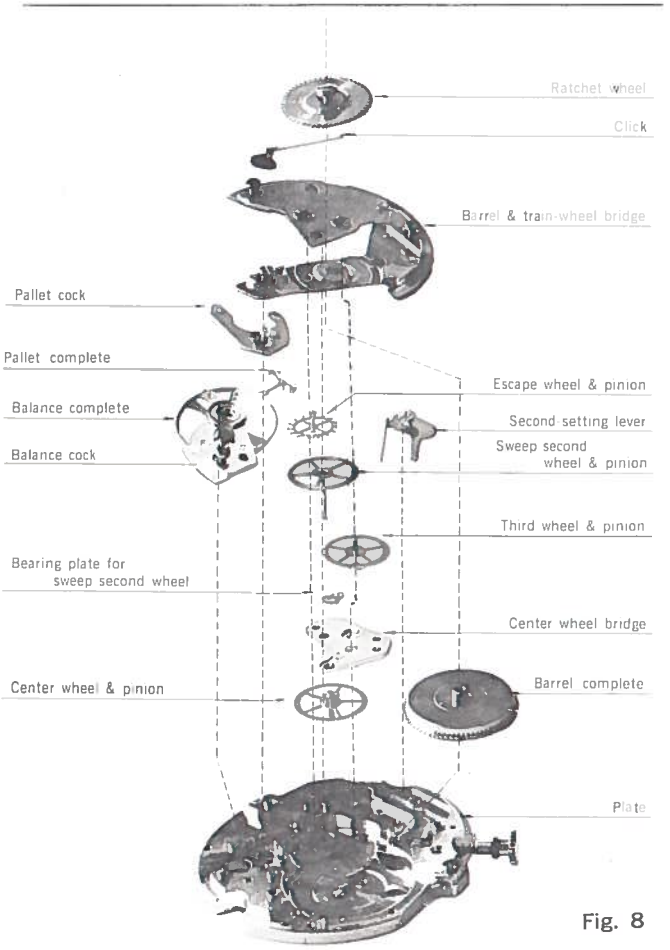


Fig. 8

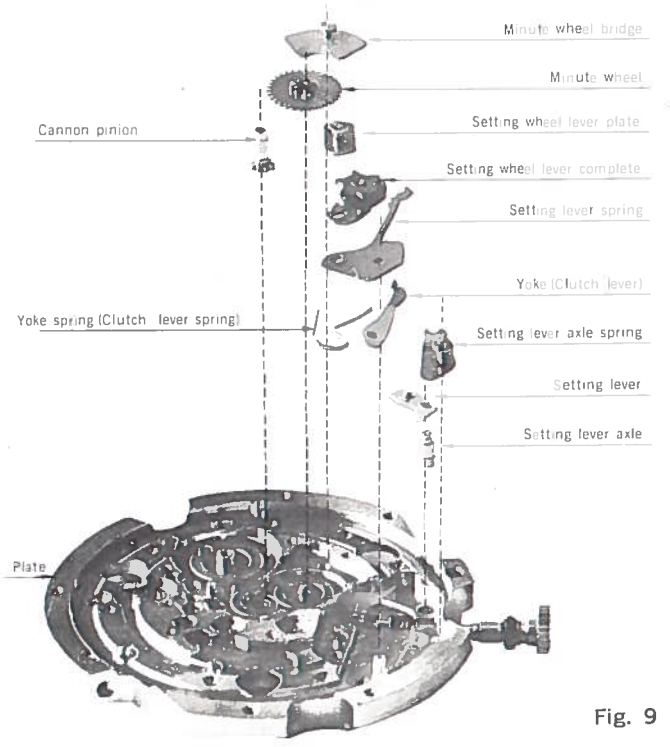
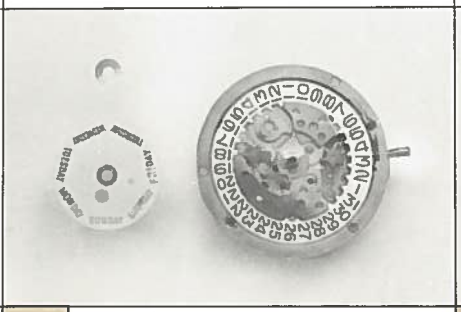
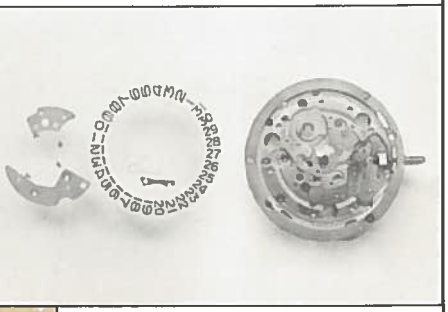


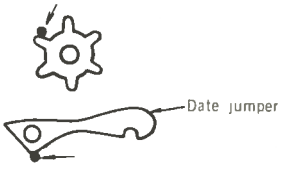
Fig. 9

6218A Disassembly and Assembly

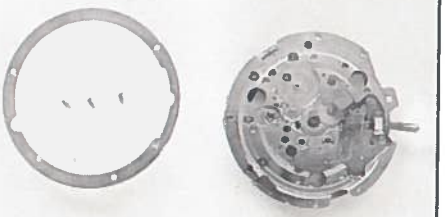
Disassembly

		1 DAY STAR WITH DIAL DISK	2 DATE DIAL
Method		1) Remove dial washer 2) Remove day star with dial disk	1) Remove date dial guard 2) Remove date jumper guard (2 screws) 3) Remove date jumper and its spring 4) Remove date dial
Remark		Do not immerse day star with dial disk into benzine, trichlorethylene, or similar cleaners	Do not immerse date dial into benzine, trichlorethylene, or similar cleaners
Photo			

Assembly

	25 INSPECTION	24 DAY STAR WITH DIAL DISK	23 DATE DIAL
Method	1) Check the teeth of day jumper meet with teeth of day star 2) By pulling out crown, check that date correction can be made at 1st stop and that time adjustment and day correction can be made at 2nd stop	1) Insert day jumper spring under date jumper guard 2) Set day star with dial disk 3) Set dial washer	1) Set date dial 2) Lubricate date jumper 3) Set date jumper and then spring 4) Set date jumper guard and fasten screws (2) 5) Set date dial guard and fasten screws (2)
Remark			Lubricate date corrector wheel 

Disassemdly

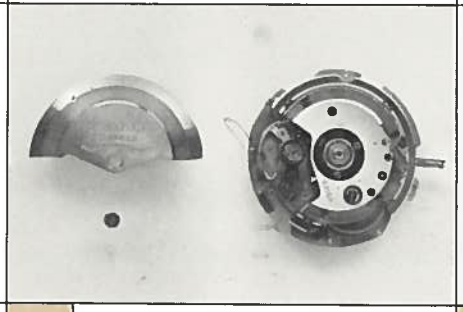
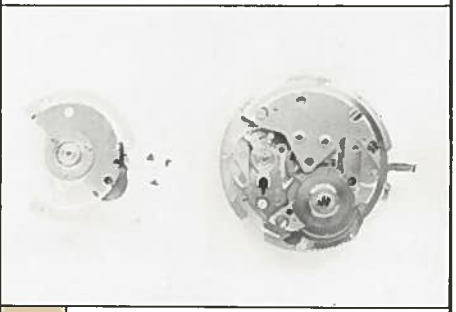
	3 DAY JUMPER	4 DAY AND DATE DRIVING WHEEL	5 HOLDING RING FOR DIAL
Method	1) Loosen day jumper screw 2) Remove day jumper 3) Remove day jumper spring from date jumper guard	1) Remove hour wheel 2) Remove intermediate date wheel 3) Remove day & date driving wheel screw 4) Remove day & date driving wheel	1) Remove screws (3) for holding ring of dial 2) Remove holding ring for dial
Remark			Screws are not used in a plastic holding ring. Note : Do not immerse plastic ring into trichlorethylene, etc.
Photo			

Assembly

	22 DAY JUMPER	21 DAY AND DATE DRIVING WHEEL	20 HOLDING RING FCR DIAL
Method	1) Check that day & date driving wheel have proper shake 2) Check that crown can be turned properly 3) Lubricate day jumper 4) Set day jumper and screw	1) Lubricate pins of day & date driving wheel and intermediate date wheel 2) Set day & date driving wheel 3) Set intermediate date wheel 4) Lubricate cannon pinion 5) Set hour wheel	1) Set holding ring for dial 2) Fasten screws (3) for holding ring of dial
Remark	Lubrication 		

6218A Disassembly and Assembly— *continued*

Disassembly

		6 OSCILLATING WEIGHT	7 FRAMEWORK FOR AUTOMATIC DEVICE
Method		1) Remove screw for oscillating weight 2) Remove oscillating weight	1) Remove screws (3) for framework of automatic device 2) Remove framework for automatic device
Remark		In loosening screw for oscillating weight press lightly on oscillating weight	
Photo			

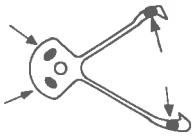
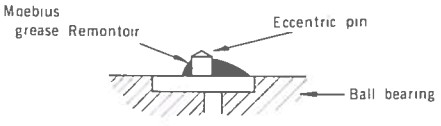
Assembly

		19 INSPECTION	18 OSCILLATING WEIGHT	17 FRAMEWORK FOR AUTOMATIC DEVICE
Method		1) Check position of pawl lever with jewel 2) Check the operation of automatic device	1) Set oscillating weight 2) Fasten screw for oscillating weight 3) Lubricate upper pivot of transmission wheel and teeth of transmission wheel	1) Lubricate lower pivot of transmission wheel 2) Set framework for automatic device on plate 3) Fasten framework screws (3)
Remark			Fasten screw thoroughly 	

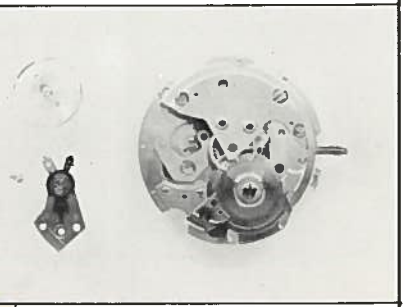
Disassembly

	8 TRANSMISSION WHEEL AND PAWL LEVER	9 BALL BEARING	10 OUT VIEW INSPECTION OF PARTS
Method	1) Remove transmission holder screw 2) Remove transmission holder 3) Remove pawl lever holder screws (2) 4) Remove pawl lever holder 5) Remove pawl lever and transmission wheel	1) Remove ball bearing holder screws (3) 2) Remove ball bearing holder 3) Remove ball bearing	1) Check each part for rust, stain, etc.
Remark	In disengaging teeth of transmission wheel and pawl lever, take care not to deform the shape of pawl lever	Do not disassemble ball bearing	
Photo			

Assembly

	16 TRANSMISSION WHEEL AND PAWL LEVER	15 BALL BEARING	
Method	1) Set pawl lever; place pawl lever holder on it, and fasten lever holding screws (2) 2) Lubricate pawl lever 3) Set transmission wheel and transmission holder, and fasten holder screw	1) Set ball bearing 2) Set ball bearing holder 3) Fasten ball bearing holder screws (3) 4) Lubricate ball bearing 5) Lubricate eccentric pin	
Remark	Lubrication 	6 balls ; total to be lubricated ; (Moebius A) Eccentric post (Moebius grease Remontoir) 	

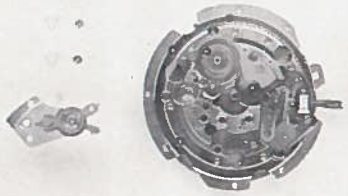
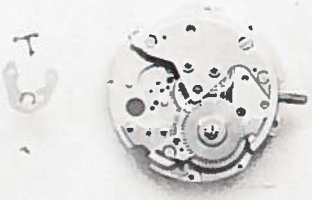
Disassembly

Method		
11 UNWINDING MAINSPRING		12 BALANCE COMPLETE
		1) Loosen stud screw 2) Loosen balance cock screw and remove balance cock 3) Turn regulator key and remove balance from cock
Remark		
		In case balance is removed, take care not to distort the shape of hairspring
Photo		
		

Assembly

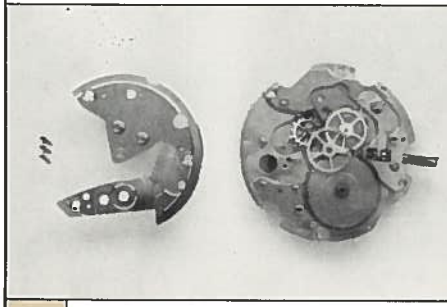
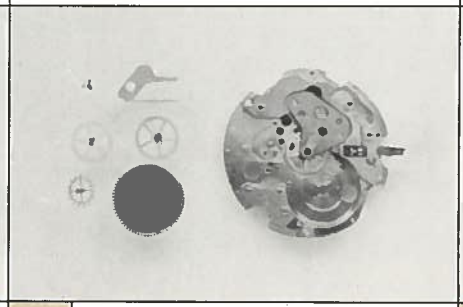
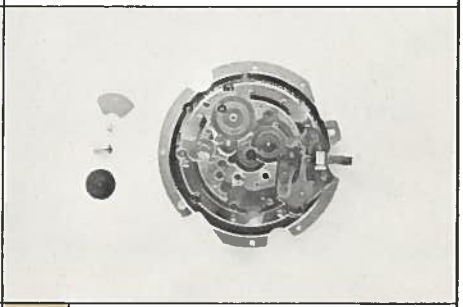
Method		
14 LUBRICATION AND INSPECTION OF OUTSIDE APPEARANCE	13 INSPECTION OF BALANCE AND PALLET	12 BALANCE COCK
1) Lubricate upper pivot of sweep second wheel pinion 2) To check amplitude, wind mainspring fully and place watch crown down. Amplitude should exceed 180°	1) Check operation of pallet 2) Check the condition of hairspring	1) Set balance on balance cock 2) Turn regulator key, so that hairspring is held (in the key) 3) Fasten stud screw, so that stud head is kept above stud holder 4) Set balance cock
Remark		

Disassembly

	13 DIASHOCK FRAME	14 PALLET COCK	15 RATCHET WHEEL
Method	1) Remove diashock springs from plate and balance cock 2) Remove cap jewel & hole jewel with frame and clean by dipping into benzine or trichlorethylene	1) Remove pallet cock screw 2) Remove pallet cock 3) Remove pallet	1) Loosen ratchet wheel screw and remove ratchet wheel 2) Loosen click screw and remove click
Remark	Use newly opened cleaning liquid Clean thoroughly with a brush	In removing pallet cock, be careful not to break or bend pallet staff	
Photo			

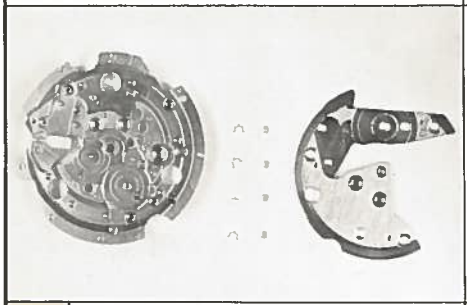
Assembly

	11 DIASHOCK FRAME	10 PALLET	9 RATCHET WHEEL
Method	1) Set diashock frame with hole jewel on cap jewel placed with flat surface upward 2) Lubricate it, holding with tweezers 3) Set diashock frames with diashock springs in balance cock and plate Lubrication : Moebius A Dia of cap jewel Max. : 1/2. Min. : 1/3.	1) Lubricate pallet jewels 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screw 5) Check that pallet have proper endshake Lubrication. Pallet jewel Moebius Chronometers	1) Set click 2) Fasten click screw 3) Set ratchet wheel 4) Fasten ratchet wheel screw
Remark			Fasten ratchet screw thoroughly

	16 BARREL AND TRAIN WHEEL BRIDGE	17 TRAIN WHEELS	18 MINUTE WHEEL AND CANNON PINION
Disassembly Method	1) Loosen barrel & train wheel bridge screws (3) 2) Remove barrel & train wheel bridge	1) Loosen second setting lever screw and remove second setting lever 2) Remove sweep second wheel & pinion, third wheel & pinion, escape wheel & pinion, and barrel complete	1) Remove cannon pinion 2) Loosen and remove minute wheel bridge screw 3) Remove minute wheel bridge and minute wheel
Disassembly Remark			
Photo			
	8 BARREL AND TRAIN WHEEL BRIDGE	7 TRAIN WHEELS	6 MINUTE WHEEL AND CANNON PINION
Assembly Method	1) Set barrel & train wheel bridge 2) Insert pivots into hole jewels 3) Fasten barrel & train wheel bridge screws (3) 4) Check proper end-shakes	1) Lubricate barrel arbo 2) Set barrel 3) Set escape wheel & pinion 4) Set third wheel & pinion 5) Lubricate sweep second wheel pinion 6) Set sweep second wheel & pinion 7) Set second-setting lever 8) Fasten second setting lever screw	1) Lubricate minute wheel pin 2) Set minute wheel and minute wheel bridge 3) Fasten minute wheel bridge screw 4) Set cannon pinion
Assembly Remark	Check wheel rotation Check space between wheels Check the second-setting		

	19 CENTER WHEEL BRIDGE	20 SETTING WHEEL LEVER COMPLETE	21 WINDING STEM
Disassemdly Method	1) Loosen and remove center wheel bridge screw 2) Remove center wheel bridge and the center wheel & pinion	1) Loosen setting lever spring screw 2) Remove setting wheel lever plate, setting wheel lever complete, setting lever spring, clutch lever spring and clutch lever	1) Loosen screw for setting lever axle spring and remove setting lever axle spring, setting lever, and setting lever axle 2) Remove winding stem and clutch wheel
Remark			
Photo			
	5 CENTER WHEEL BRIDGE	4 SETTING WHEEL LEVER COMPLETE	3 WINDING STEM
Assembly Method	1) Lubricate center wheel pinion 2) Set center wheel & pinion 3) Set center wheel bridge 4) Fasten center wheel bridge screw	Lubricate setting wheel lever complete 1) Set clutch lever 2) Set clutch lever spring 3) Lubricate clutch lever and pin of setting wheel 4) Set setting wheel lever complete 5) Set setting lever spring 6) Set setting wheel lever plate 7) Fasten setting lever spring screw	1) Set clutch wheel and winding stem 2) Set setting lever axle and setting lever 3) Set setting lever axle spring and fasten screw
Remark			

Disassembly

	21 DIAFIX	22 CLEANING
Method	1) Remove diafix springs from barrel & train wheel bridge and plate 2) Remove cap jewels 3) Clean them in benzine or trichlorethylene	1) Clean all disassembled parts (refer to "Cleaning" for further details)
Remark	Use newly opened cleaning liquid Clean thoroughly with a brush	
Photo		

Assembly

	2 DIAFIX	1 LUBRICATION
Method	1) Insert cap jewels into diafix frames of plate and barrel & train wheel bridge 2) Set diafix springs 3) Lubricate them (Moebius A) Dia. of cap jewel max.: 1/2 min.: 1/3	1) Lubricate winding stem, clutch wheel, and setting lever (head of axle) Moebius A
Remark		

6619A (Seiko Sportsmatic 5)

1) Specifications

Casing diameter	27.60 mm
Height	6.40 mm
Vibrations per hour	18,000
Automatic winding with sweep second	
Calendar (day & date)	

2) Automatic winding mechanism

2-1 Development of automatic winding mechanism Fig. 1

2-2 Transmission of force in automatic winding mechanism. This mechanism is the most simplified now on the market and consists mainly of the pawl lever transmission wheel.

The oscillating weight may be rotated even by a slight arm motion, and its rotating torque is transmitted to the pawl lever by an eccentric pin fixed on the ball-bearing. Fig. 2

3) Calendar mechanism

3-1 Development of calendar device Fig. 3

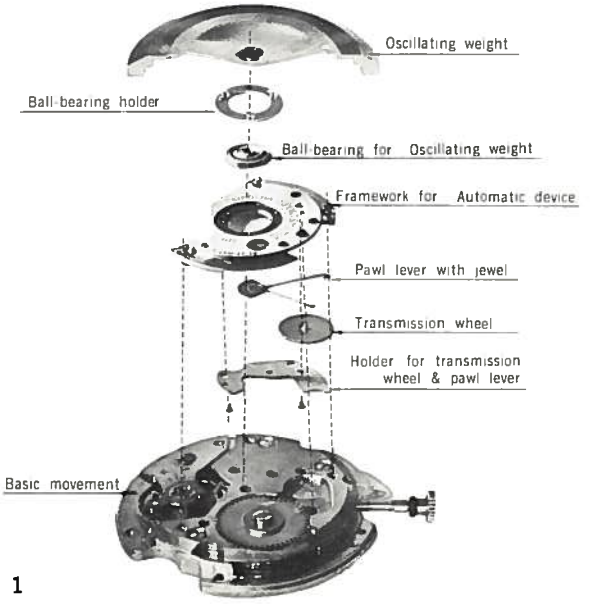


Fig. 1

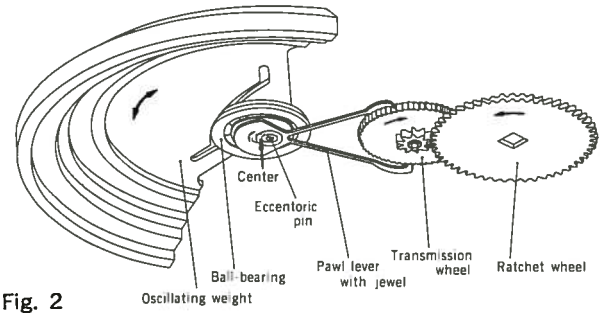


Fig. 2

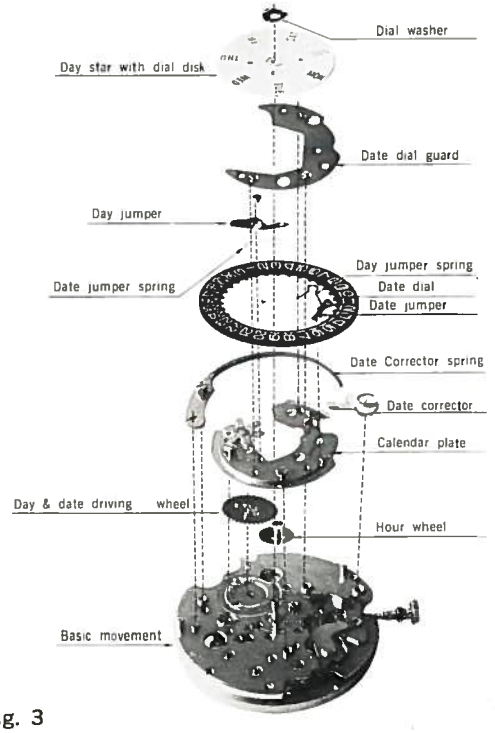


Fig. 3

*1) **Date driving mechanism***

Hour wheel (Date wheel) → Day & date driving wheel → Date finger → Date dial

*2) **Day driving mechanism***

Day & date driving wheel → Day finger
Day finger (pin)→Day driving wheel→
Day star (pin)→Day driving wheel→
Day star with dial disk
Fig. 4,

3-2 Day and date setting

❶ Pull out the crown and turn it until the correct day is obtained.

❷ Return the crown to its original position, then push in to advance the date.

❸ Date setting cannot be done from 9 p.m. to 2 a.m.

Note: In models carrying the calibres 410 and 6606B, the date is advanced by moving the hands back and forth between 9 p.m. and 1 a.m.

4) Basic movement
Fig. 5 Fig. 6

5) Disassembly and assembly
See p. 88～p. 95

6) Checking (after casing)

❶ Space between hands
❷ Crown (by working)
❸ Rotation of hands
❹ Day and date setting
❺ Date changes around midnight; day changes at 1 a.m.
❻ Positions of hour and minute hands at 12 o'clock
❼ Gasket placement
❽ Waterproof tests

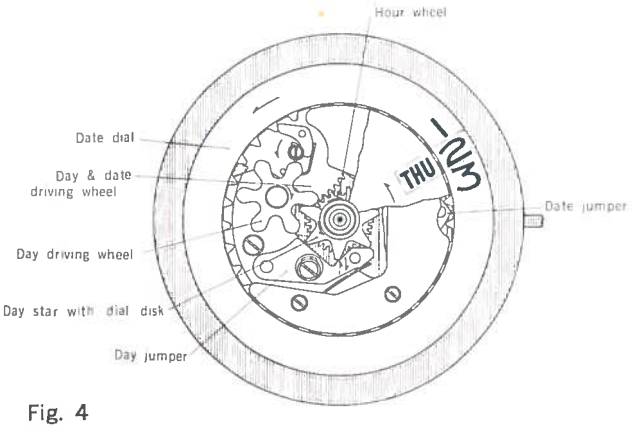


Fig. 4

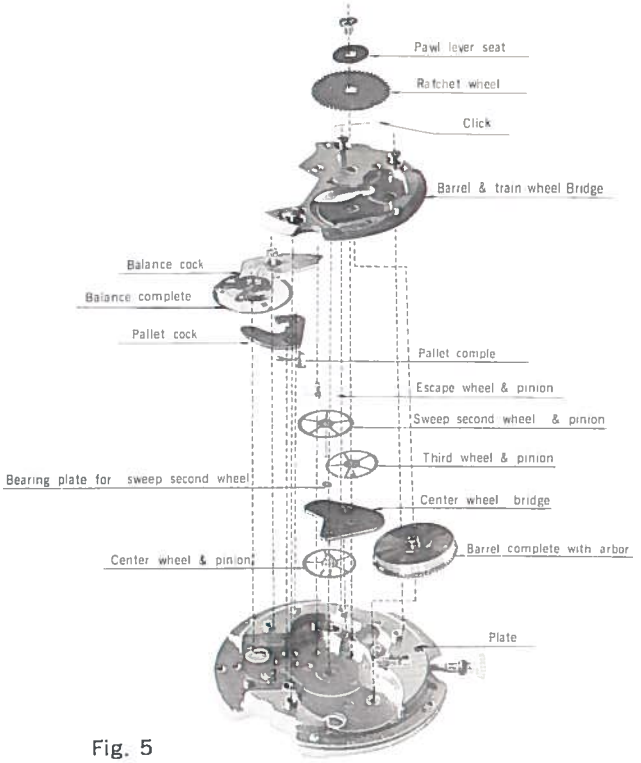


Fig. 5

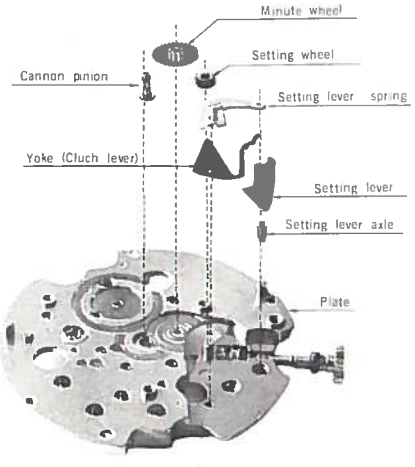


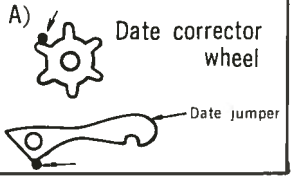
Fig. 6

6619A Disassembly and Assembly

Disassembly

	1 DAY STAR WITH DIAL DISK	2 DATE DIAL GUARD	3 DATE DIAL
Method	1) Remove dial washer 2) Remove day star with dial disk	1) Remove date dial guard screws (3) 2) Remove date dial guard 3) Remove day jumper spring	1) Remove date jumper spring 2) Remove date jumper 3) Remove date dial
Remark		Be careful that the day jumper spring does not leap off	Be careful that the date jumper spring does not leap off
Photo			

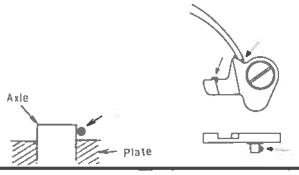
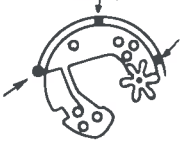
Assembly

	21 DAY STAR WITH DIAL DISK	20 DATE DIAL GUARD	19 DATE DIAL AND DATE JUMPER
Method	1) Set day star with dial disk 2) Set dial washer	1) Set day jumper spring into date dial guard 2) Set dete dial guard 3) Fasten date dial guard screws (3)	1) Set dete dial 2) Set date jumper 3) Set date jmper spring
Remark		Check the condition of date correction device	Be careful date jumper spring not to leap off Lubricate date jumper (Moebius A) 

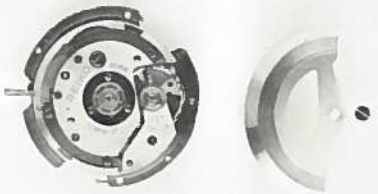
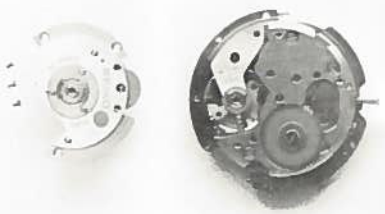
Disassembly

	4 DAY JUMPER	5 DATE CORRECTOR	6 CALENDAR PLATE
Method	1) Remove day jumper screw 2) Remove day jumper	1) Remove date corrector spring screw 2) Remove date corrector spring 3) Remove date corrector screw 4) Remove date corrector	1) Remove calendar plate screws (3) 2) Remove calender plate 3) Remove hour wheel
Remark			
Photo			

Assembly

	18 DAY JUMPER	17 DATE CORRECTOR	16 CALENDAR PLATE
Method	1) Set day jumper 2) Fasten day jumper screw	1) Set date corrector 2) Fasten date corrector screw 3) Set date corrector spring 4) Fasten date corrector spring screw	1) Set hour wheel 2) Set calendar plate 3) Fasten calendar plate screws (3)
Remark	Lubricate day jumper (Moebius A) 	Lubricate date corrector axle and date corrector pin (Moebius grease Remontoir) 	Lubricate calendar plate  Lubricate cannon pinion (Moebius A)

Disassembly

	7 DAY AND DATE DRIVING WHEEL	8 OSCILLATING WEIGHT	9 FRAMEWORK FOR AUTOMATIC DEVICE
Method	1) Remove day & date driving wheel 2) Remove minute wheel 3) Remove setting wheel	1) Remove screw for oscillating weight 2) Remove oscillating weight	1) Remove screws (3) for framework of automaic device 2) Remove framework for automatic device
Remark			
Photo			

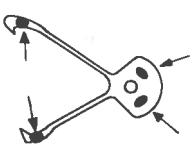
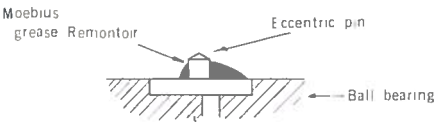
Assembly

	15 DAY AND DATE DRIVING WHEEL	14 OSCILLATING WEIGHT	13 FRAMEWORK FOR AUTOMATIC DEVICE
Method	1) Set setting wheel 2) Set minute wheel 3) Set day & date driving wheel	1) Set oscillating weight 2) Fasten screw for oscillating weight 3) Check the position of pawl lever with jewel	1) Set framework for automatic device 2) Fasten screws (3) for framework of automatic device
Remark	Lubricate minute wheel lower pivot Lubricate day & date driving wheel lower pivot (Moebius A)	Check the condition of automatic winding mechanism	Lubricate transmission wheel lower pivot and wheel teeth (Moebius A)

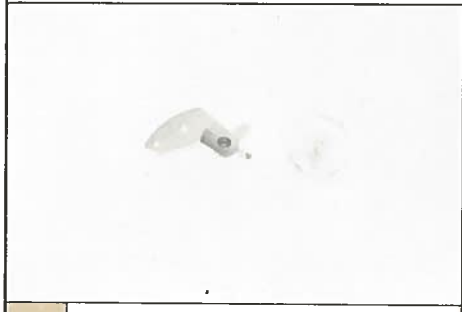
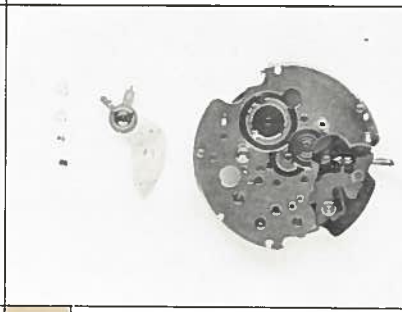
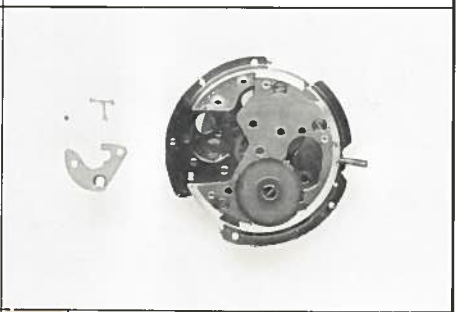
Disassemdly

	10 HOLDER FOR TRANSMISSION WHEEL & PAWL LEVER	11 BALL BEARING FOR OSCILLATING WEIGHT	12 BALANCE COCK
Method	1) Remove holder screws (2) 2) Remove holder 3) Remove pawl lever 4) Remove transmission wheel	1) Remove ball bearing screws (3) 2) Remove ball bearing holder 3) Remove ball bearing	1) Remove balance cock screw 2) Remove balance cock
Remark	As to disengage teeth of transmission wheel and pawl lever in gear, be careful not to deform the shape of pawl lever	Do not disassemble ball bearing	
Photo			

Assembly

	12 PAWL LEVER & TRANSMISSION WHEEL	11 BALL BEARING	10 BALANCE COCK
Method	1) Set transmission wheel 2) Set pawl lever 3) Set holder for transmission wheel and pawl lever 4) Fasten holder screws (2)	1) Set ball bearing 2) Set ball bearing holder 3) Fasten ball bearing screws (3)	1) Set balance cock 2) Fasten balance cock screw
Remark	Lubricate upper jewel for transmission wheel, and pawl lever (Moebius A) 	Lubricate ball bearing (Moebius A) Lubricate each of six balls Lubricate eccentric pin (Moebius grease Remontoir) 	Check the condition of hair spring Confirm end-shake of balance

Disassembly

	13 BALANCE FROM BALANCE COCK	14 DIASHOCK FRAME	15 PALLET
Method	1) Loosen stud screw and remove stud from balance cock 2) Remove balance by turning regulator key	1) Remove diashock springs from plate and balance cock 2) Remove cap jewel and hole jewel with frame and clean them with benzine or trichlorethylene	1) Remove pallet cock screw 2) Remove pallet cock 3) Remove pallet
Remark	In case balance is removed be careful not to distort the shape of the hair spring	Cleaning liquid should be newly opened Cleaning should be done carefully with a brush	When pallet cock is removed be careful that pallet staff is neither broken nor bent
Photo			

Assembly

	9 BALANCE COMPLETE WITH STUD	8 DIASHOCK FRAME	7 PALLET
Method	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 stud holder (in proper position)	1) Set diashock frame with hole jewel on cap jewel placed with flat surface upward 2) Lubricate it, holding with tweezers 3) Set diashock frames with diashock springs in balance cock and plate	1) Lubricate pallet jewels 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screw
Remark		Extent of lubrication :— (Moebius A) Dia. of cap jewels Max. 1/2 Min. 1/3	Lubricate pallet jewel (Moebius Chronometers) After carefully confirming the setting of pallet pivot, fasten screw

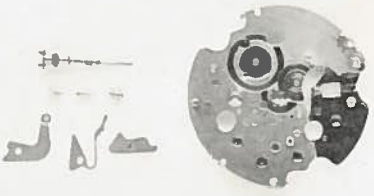
Disassembly

	16 RATCHET WHEEL AND CLICK	17 BARREL AND TRAIN WHEEL BRIDGE	18 TRAIN WHEELS
Method	1) Remove ratchet wheel screw 2) Remove ratchet wheel and pawl lever seat 3) Remove click	1) Remove barrel & train wheel bridge screws (3) 2) Remove barrel & train wheel bridge	1) Remove third, fourth, and escape wheels and pinions 2) Remove barrel 3) Remove bearing plate for sweep second wheel
Remark			Be careful not to lose bearing plate for sweep second wheel
Photo			

Assembly

	6 CLICK AND RATCHET WHEEL	5 BARREL AND TRAIN WHEEL BRIDGE	4 TRAIN WHEELS
Method	1) Set click 2) Set ratchet wheel 3) Set pawl lever seat 4) Fasten ratchet wheel screw	1) Set barrel & train wheel bridge, inserting pivots into hole jewels 2) Fasten bridge screws (3) 3) Confirm that there are proper end-shakes 4) Lubricate upper and lower pivots	1) Set barrel 2) Set escape wheel & pinion 3) Set bearing plate for sweep second wheel 4) Set sweep second wheel & pinion 5) Set third wheel & pinion
Remark		After confirming the smooth turning of wheels, fasten screws	Lubricate barrel arbor and fourth wheel & pinion (Moebius A)

Disassembly

	19 CANNON PINION	20 CENTER WHEEL AND PINION	21 WINDING STEM
Method	1) Remove cannon pinion	1) Remove center wheel bridge screw 2) Remove center wheel bridge 3) Remove center wheel & pinion	1) Remove screw for setting lever axle spring 2) Remove setting lever axle spring 3) Remove clutch lever 4) Remove setting lever 5) Remove setting lever axle 6) Remove winding stem 7) Remove clutch wheel
Remark			
Photo			

Assembly

	3 CANNON PINION	2 CENTER WHEEL AND PINION	1 WINDING STEM
Method	1) Set cannon pinion	1) Lubricate center wheel & pinion 2) Set center wheel & pinion 3) Set center wheel bridge 4) Fasten center wheel bridge screw 5) Confirm that there is proper end-shake	1) Lubricate 2) Set clutch wheel 3) Set winding stem 4) Set setting lever with axle 5) Set clutch lever 6) Set setting lever axle spring 7) Fasten setting lever axle spring screw
Remark		Lubricate center wheel & pinion (Moebius A)	Places of lubrication (Moebius A) Winding stem Clutch wheel Setting lever with axle Pin for setting wheel

Disassembly	Method	22 CLEANING 1) Clean all parts so far disassembled (for farther particulars see the section of "cleaning".)
	Remark	
	Photo	
Assembly	Method	
	Remark	

7606A (Seiko Spotrsmatic 5 deluxe)

1. Specifications

Casing diameter	27.60 mm
Height	6.25 mm
Vibrations per hour	18,000
Automatic winding	
with sweep second	
Calendar (day and date)	
with date-setting button	

2. Automatic winding mechanism

2–1. *Development of automatic winding mechanism* (Fig. 1)

2–2. *Transmission of force in automatic winding mechanism*

This unit is the most simplified now on the market. It consists of a pawl lever and a transmission wheel. (Figs. 2 & 3)

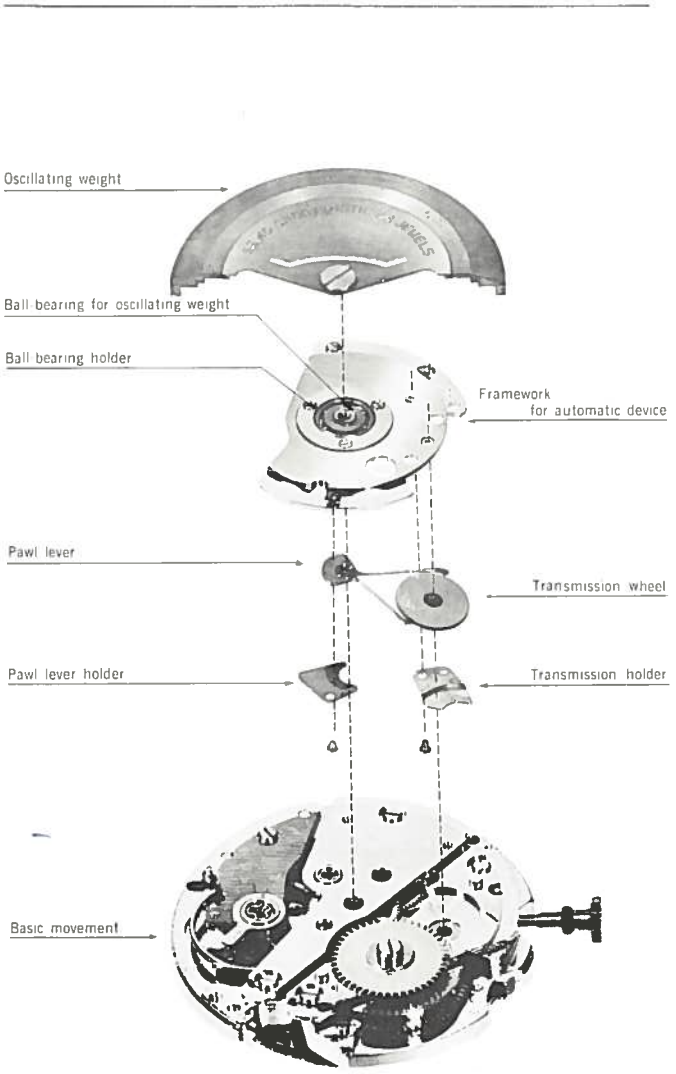


Fig. 1

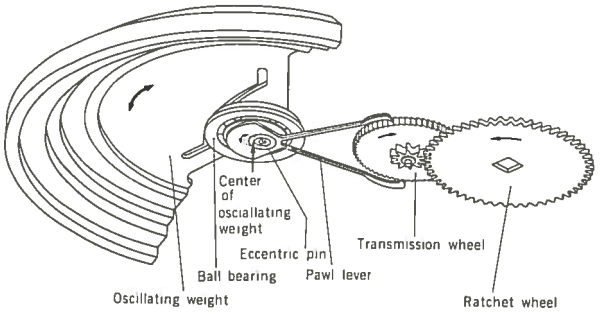


Fig. 2

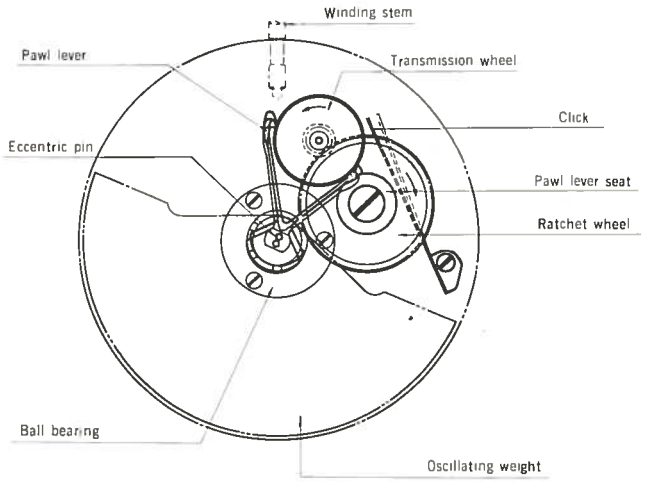


Fig. 3

2–3. *Functions of automatic winding mechanism*

The force produced even by a slight arm motion rotates the oscillating weight mounted on a ball-bearing ; this motion is transmitted to the pawl lever, through an eccentric pin also fixed on the ball-bearing. The pawl lever turns the transmission wheel in one direction only. (Fig. 4)

As the transmission wheel gears into the ratchet wheel, the mainspring is wound.

3. Calendar mechanism

3–1. *Development of the calendar device*

(Figs. 5 & 6)

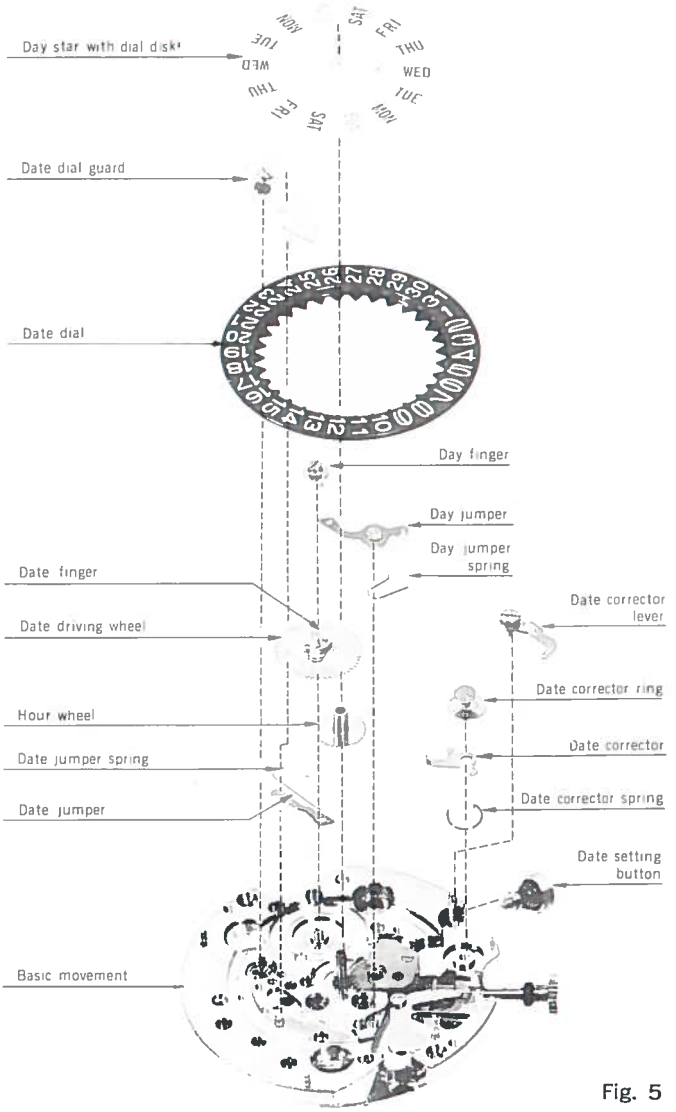


Fig. 5

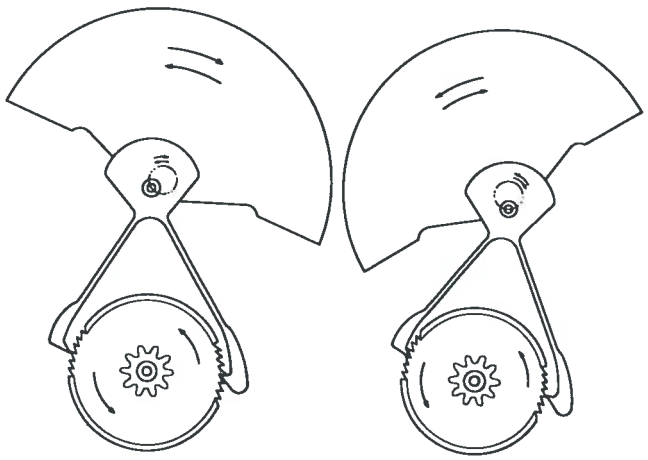


Fig. 4

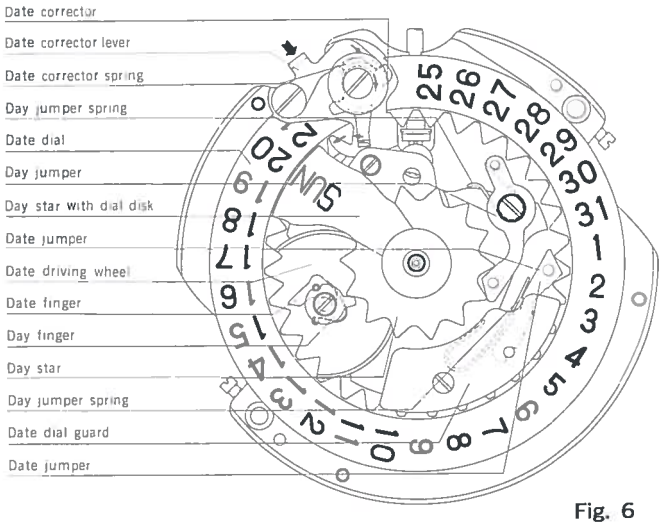


Fig. 6

3–2. *Date-driving mechanism*

Hour wheel → Date driving wheel → Date finger → Date dial

3–3. *Date dial setting*

In this watch, the date is set simply by pushing the date-setting button located at the 3 o'clock position. (See Fig. 7) Date-setting can not be done from 9 p.m. to 2 a.m.

3–4. *Day-driving mechanism*

Hour wheel → Date driving wheel → Day finger → Day star with dial disk (See Figs. 5 and 6).

3–5. *Day setting*

Rotate the hour hand until correct day is obtained.

4. Basic movement
(Fig. 8 & 9)

5. Disassembly and Assembly
See p. 99～p. 107

6. Checking

❶ Space between hands
❷ Rotation of hands
❸ Day and date setting
❹ Date change around midnight; day change around 1 a.m.
❺ Position of hour and minute hands at 12 o'clock.
❻ Operation of the date setting button.
❼ Waterproof tests.

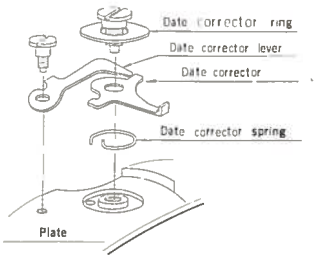


Fig. 7

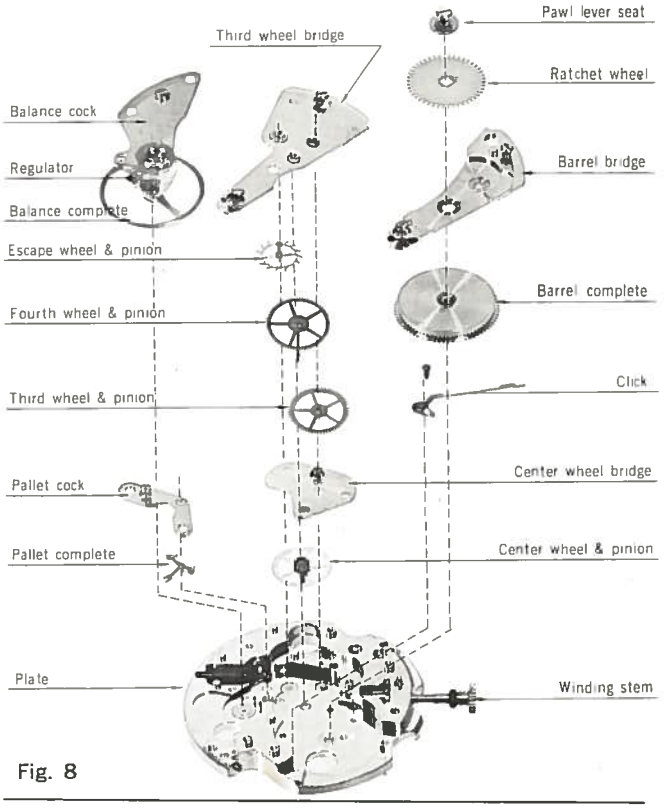


Fig. 8

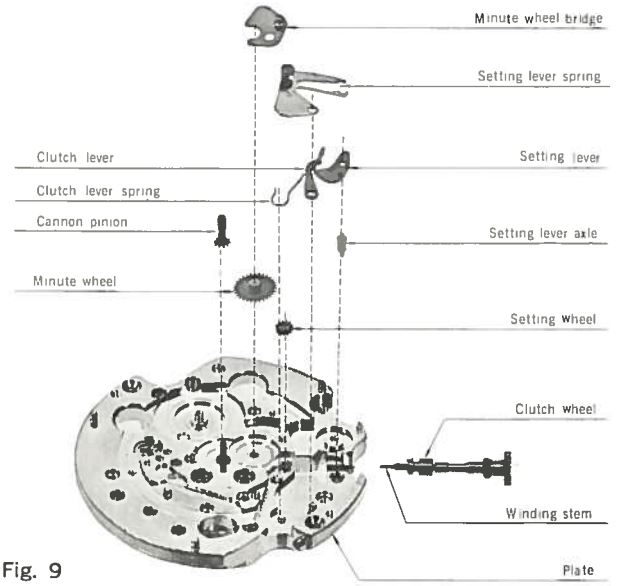


Fig. 9

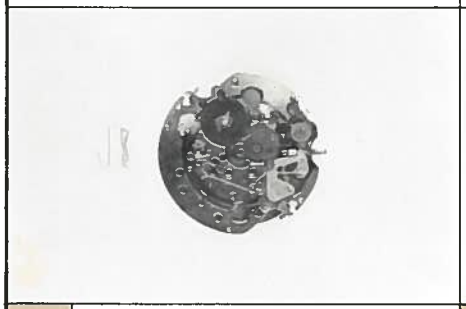
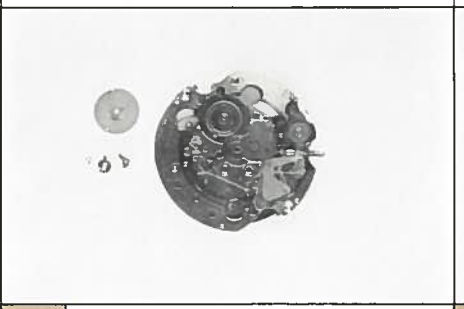
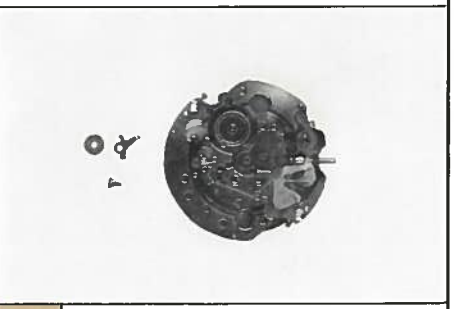
7606A Disassembly and Assembly

Disassembly

	0 DAY STAR WITH DIAL DISK	1 DAY JUMPER	2 DATE DIAL
Method	1) Remove dial washer 2) Remove day star with dial disk	1) Remove day jumper screw 2) Remove day jumper 3) Remove day jumper spring 4) Remove hour wheel	1) Remove date dial screw 2) Remove date dial guard screw 3) Remove date dial guard 4) Remove date dial
Remark			As date dial is removed, press on date jumper and also spring, so that date jumper spring will not leap off
Photo			

Assembly

		24 DAY JUMPER	23 DATE DIAL GUARD
Method		1) Set day jumper spring 2) Lubricate day jumper (Moebius A) 3) Set day jumper 4) Fasten day jumper screw 5) Set hour wheel 6) Set day star with dial disk 7) Set dial washer	1) Set date dial guard 2) Fasten date dial guard screw 3) Fasten date dial screw
Remark		Check end shake of day jumper	Check date correcting by date corrector

	3 DATE JUMPER	4 DATE DRIVING WHEEL	5 DATE CORRECTOR
Disassembly Method	1) Remove date jumper 2) Remove date jumper spring	1) Remove date driving wheel screw 2) Remove day finger 3) Remove date finger 4) Remove date driving wheel	1) Remove date corrector screw 2) Remove date corrector ring 3) Remove date corrector
Disassembly Remark		Be careful in handling date finger spring	
Photo			
	22 DATE DIAL AND DATE JUMPER	**21 DATE DRIVING WHEEL**	**20 DATE CORRECTOR**
Assembly Method	1) Set date jumper spring 2) Set date dial 3) Lubricate date jumper (Moebius A) 4) Set date jumper	1) Lubricate date driving wheel axle (Moebius A) 2) Set date driving wheel 3) Set date finger 4) Set day finger 5) Fasten date driving wheel screw	1) Set date corrector spring 2) Set date corrector 3) Lubricate date corrector screw hole (Moebius grease) 4) Set date corrector ring 5) Fasten date corrector screw
Assembly Remark	Be careful that the spring does not leaped off	Set date driving wheel with longer side of axle upward Confirm end shake of date finger	

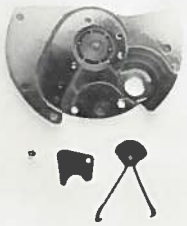
Disassembly

	6 DATE CORRECTOR LEVER	7 OSCILLATING WEIGHT	8 FRAMEWORK FOR AUTOMATIC DEVICE
Method	1) Remove date corrector lever screw 2) Remove date corrector spring 3) Remove date corrector lever	1) Remove screw for oscillating weight 2) Remove oscillating weight	1) Remove Screws for framework of automatic device (3 pcs.) 2) Remove framework for automatic device
Remark			
Photo			

Assembly

	19 DATE CORRECTOR LEVER	18 OSCILLATING WEIGHT	17 FRAMEWORK FOR AUTOMATIC DEVICE
Method	1) Set date corrector lever 2) Lubricate hole for date corrector lever screw (Moebius grease) 3) Fasten date corrector lever screw	1) Set oscillating weight 2) Fasten screw for oscillating weight	1) Lubricate hole jewels of third wheel bridge 2) Set framework for automatic device 3) Fasten screws for framework of automatic device (3 pcs.) 4) Lubricate teeth of transmission wheel
Remark		Check operation of oscillating weight carefully to see that it does not touch plate	Lubricate them (Moebius A) Check position of pawl lever

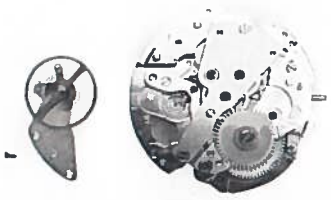
Disassembly

	9 TRANSMISSION WHEEL FROM FRAMEWORK	10 PAWL LEVER	11 BALL BEARING OF OSCILLATING WEIGHT
Method	1) Remove transmission holder screw and holder 2) Remove transmission wheel	1) Remove pawl lever holder screw 2) Remove pawl lever holder 3) Remove pawl lever	1) Remove ball bearing screws (3 pcs.) 2) Remove ball bearing holder 3) Remove ball bearing
Remark			It is impossible to disassemble ball bearing into its component parts
Photo			

Assembly

	16 TRANSMISSION WHEEL	15 PAWL LEVER	14 BALL BEARING
Method	1) Lubricate upper and lower pivots of transmission wheel 2) Set transmission wheel 3) Set transmission holder 4) Fasten transmission holder screw	1) Lubricate pawl lever (Moebius A) 2) Lubricate eccentric pin of ball bearing (Moebius grease) 3) Set pawl lever 4) Set pawl lever holder 5) Fasten pawl lever holder screw	1) Set ball bearing 2) Set ball bearing holder 3) Fasten ball bearing holder screws (3 pcs.)
Remark	Lubricate it (Moebius A)	Be careful not to confuse front and back of pawl lever	Lubricate each of six balls (Moebius A)

Disassembly

	12 BALANCE COCK	13 DISASSEMBLY BALANCE FROM BALANCE COCK	14 UNWINDING OF MAINSPRING
Method	1) Remove balance cock screw 2) Remove balance cock	1) Turn regulator key with a screw-driver and then remove hair-spring 2) By loosening stud screw, remove stud, and balance	1) First turn the ratchet wheel screw to the right with a screw-driver briefly 2) Then, disengage click and ratchet wheel from gearing with tweezers and slowly unwind the spring
Remark		Be careful not to distort the shape of the hairspring	In unwinding main spring will return to its unwound condition by its own force. Please do not try to unwind further by a screw-driver
Photo			

Assembly

	13 BALANCE COCK	12 BALANCE COMPLETE WITH STUD	
Remark	1) Set balance cock 2) Fasten balance cock screw 3) Wind mainspring by turning ratchet screw for one round	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)	
Method	Check the condition of hair spring Confirm end shake of balance		

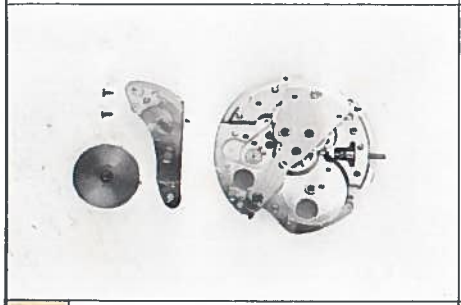
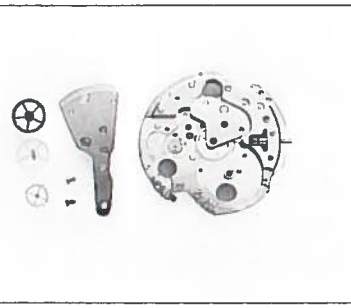
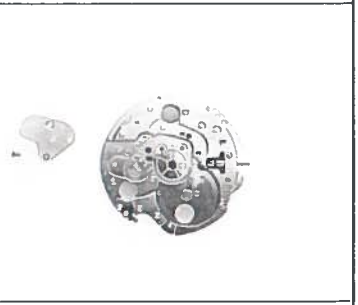
Disassembly

	15 PALLET	16 RATCHET WHEEL	17 CLICK
Method	1) Remove pallet cock screw 2) Remove pallet cock 3) Remove pallet	1) Remove ratchet wheel screw 2) Remove pawl lever seat 3) Remove ratchet wheel	1) Remove click screw 2) Remove click
Remark			
Photo			

Assembly

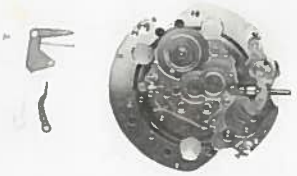
	11 PALLET	10 RATCHET WHEEL	9 CLICK
Method	1) Lubricate pallet jewels (Moebius Chronometers) 2) Set pallet 3) Set pallet cock 4) Fasten pallet cock screw 5) Lubricate upper and lower pivots of pallet (Moebius A)	1) Set ratchet wheel 2) Set pawl lever seat 3) Fasten ratchet wheel screw	1) Set click 2) Fasten click screw
Remark	Check that pallet pivots has been put in jewel holes, and then fasten bridge screw		

Disassembly

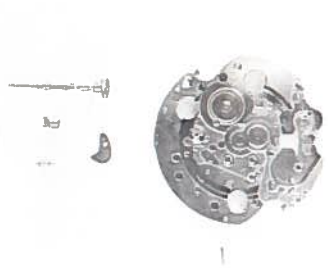
	18 BARREL BRIDGE	19 THIRD WHEEL BRIDGE	20 CENTER WHEEL BRIDGE
Method	1) Remove barrel bridge screws (2 pcs.) 2) Remove barrel bridge 3) Remove barrel	1) Remove third wheel bridge screws (2 pcs.) 2) Remove third wheel bridge 3) Remove sweep second wheel and pinion 4) Remove escape wheel and pinion 5) Remove third wheel and pinion	1) Remove center wheel bridge screw 2) Remove center wheel bridge
Remark	As barrel is removed, be careful not to touch sweep second wheel with barrel		Center wheel and pinion in this condition is still set with cannon pinion
Photo			

Assembly

	8 BARREL BRIDGE	7 THIRD WHEEL BRIDGE	6 CENTER WHEEL BRIDGE
Method	1) Lubricate barrel arbor (Moebius A) 2) Set barrel 3) Set barrel bridge 4) Fasten barrel bridge screws (2 pcs.)	1) Lubricate lower jewel for sweep second wheel and pinion 2) Set third wheel and pinion 3) Set escape wheel and pinion 4) Lubricate lower pivot of sweep second wheel and pinion 5) Set third wheel bridge, inserting pivots into hole jewels 6) Fasten bridge screws (2 pcs.)	1) Lubricate upper and lower pivots of center wheel and pinion 2) Set center wheel and pinion 3) Set center wheel bridge 4) Fasten center wheel bridge screw 5) Set cannon pinion 6) Lubricate gearing portions of setting wheel, hour wheel, and minute wheel
Remark		Lubricate them (Moebius A) Make sure that train wheels rotate smoothly before fastening bridge screws Check end shake of each wheel and pinion	Lubricate them (Moebins A) Check wheel turning before fasten bridge screw Check end shake of center wheel and pinion

	21 MINUTE WHEEL	22 CENTER WHEEL AND PINION	23 CLUTCH LEVER
Disassembly Method	1) Remove minute wheel bridge screw 2) Remove minute wheel bridge and minute wheel 3) Remove setting wheel	1) Remove cannon pinion 2) Remove center wheel and pinion	1) Remove setting lever spring screw 2) Remove setting lever spring 3) Remove clutch lever spring 4) Remove clutch lever
Remark		To remove cannon pinion, pull up perpendicularly against the plate	
Photo			

	5 MINUTE WHEEL		4 CLUTCH LEVER
Assembly Method	1) Lubricate minute wheel axle 2) Lubricate setting wheel axle 3) Set setting wheel 4) Set minute wheel 5) Set minute wheel bridge 6) Fasten minute wheel bridge screw		1) Lubricate clutch lever tube (Moebius A) 2) Set clutch lever 3) Set clutch lever spring 4) Set setting lever spring 5) Fasten setting lever spring screw
Remark	Set setting wheel with chamfered surface downward Lubricate them (Moebius A)		

Disassembly	24 WINDING STEM	25 DIAFIX	26 DIASHOCK FRAME
Method	1) Remove setting lever 2) Remove setting lever axle 3) Remove winding stem 4) Remove clutch wheel	1) Remove diafix springs from plate and third wheel bridge 2) Remove cap jewels	1) Remove diashock springs from plate and balance cock 2) Remove cap and hole jewels with frame, and clean them with benzine or trichlorethylene
Remark			
Photo			

Assembly	3 WINDING STEM	2 DIAFIX	1 DIASHOCK FRAME
Method	1) Set clutch wheel 2) Lubricate winding stem 3) Set winding stem 4) Set setting lever axle 5) Lubricate setting lever 6) Lubricate clutch wheel	1) Insert cap jewels into diafix frames of plate and third wheel bridge 2) Set diafix springs 3) Lubricate them	1) Set diashock frame with hole jewel on cap jewel placed with flat surface upward 2) Lubricate it, holding tweezers 3) Set diashock frames with diashock springs in balance cock and plate
Remark	Lubricate them (Moebius A)	Extent of lubrication :— (Moebius A) Dia. of cap jewels Max. 2/3 Min. 1/3	Extent of lubrication :— (Moebius A) Dia. of cap jewels Max. 1/2 Min. 1/3

8305C (Seikomatic)

1. Specifications

Casing diameter	28.60 mm
Height	4.55 mm
Vibrations per hour	18,000
Automatic winding with sweep second	
Calendar (date)	

2. Automatic winding mechanism

2-1. *Development of automatic winding mechanism*

Fig. 1

2-2. *Transmission of force*

The transmission route of force in the automatic winding mechanism is as follows : Oscillating weight (with ball-bearing) → First reverser idler → Second reverser idler → Roller locking wheel → First reduction wheel → Second reduction wheel → Ratchet wheel.

The rotating direction (clockwise or counter-clockwise) of the oscillating weight is adjusted in only one direction through the roller locking wheel which continuously winds the ratchet wheel. Fig. 2

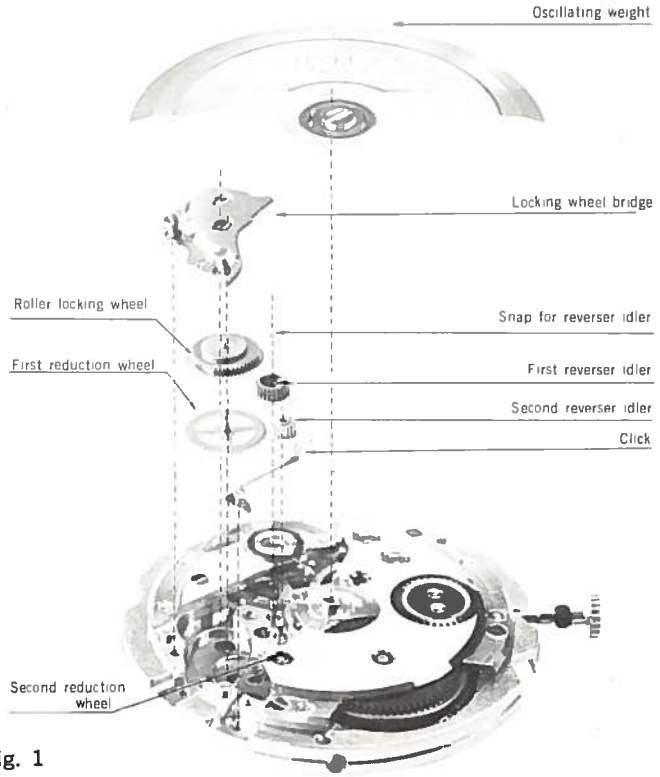


Fig. 1

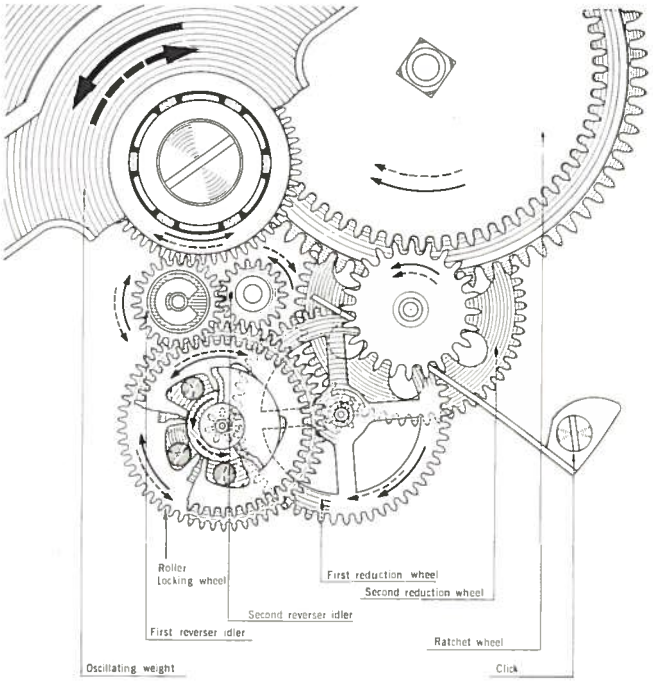


Fig. 2

3. Calendar mechanism

3–1. *Development of calendar device*

Fig. 3

3–2. *Transmission of force in the calendar device*

The hour wheel rotates the date dial by the finger of the date driving wheel through the intermediate date wheel.

Fig. 4

3–3. *Date setting*

The crown of this watch is of the three-position pull-out type.

Continuous date change is obtained by rotating the crown when it is pulled out to the second position. Fig. 5, 6 & 7

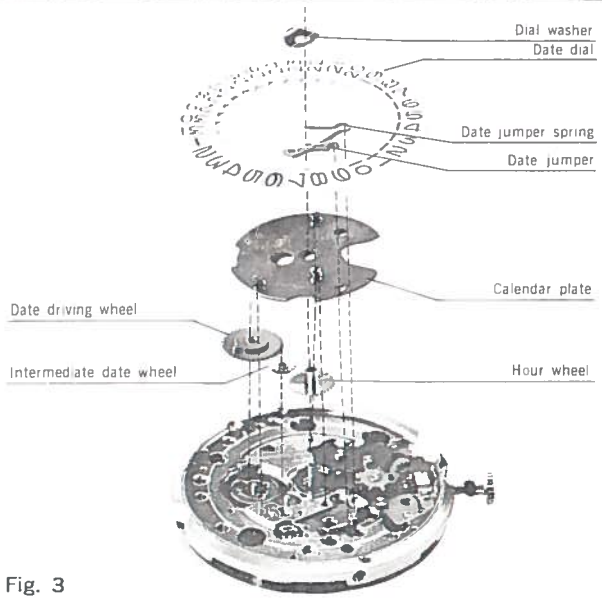


Fig. 3

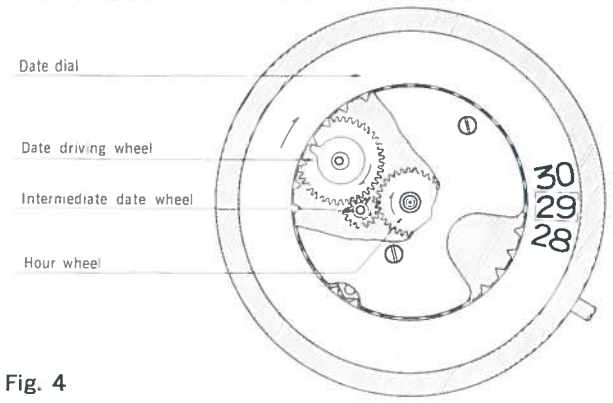


Fig. 4

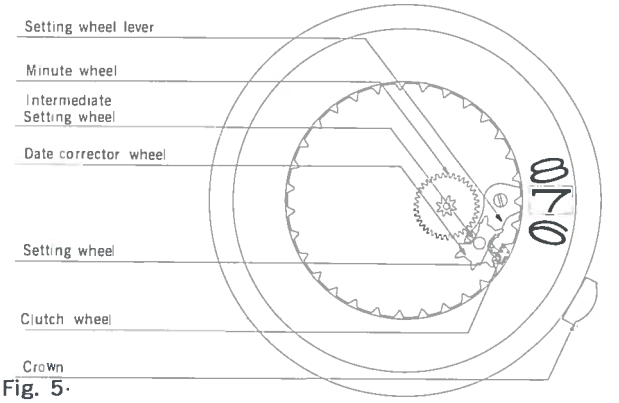


Fig. 5

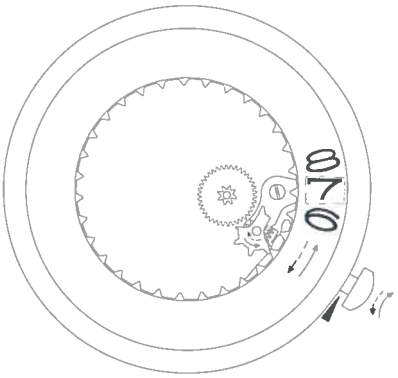


Fig. 6

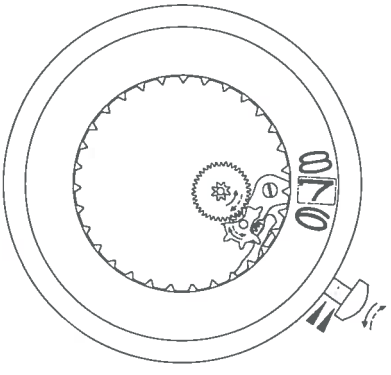


Fig. 7

4. Basic movement

Fig. 8

Fig. 9

5. Disassembly and assembly

See p. 111~p. 118

6. Checking

❶ Space between hands
❷ The crown (by working)
❸ Rotation of hands
❹ Date setting
❺ Date changes around midnight
❻ Position of hour and minute hands at 12 o'clock
❼ Gasket placement
❽ Waterproof tests

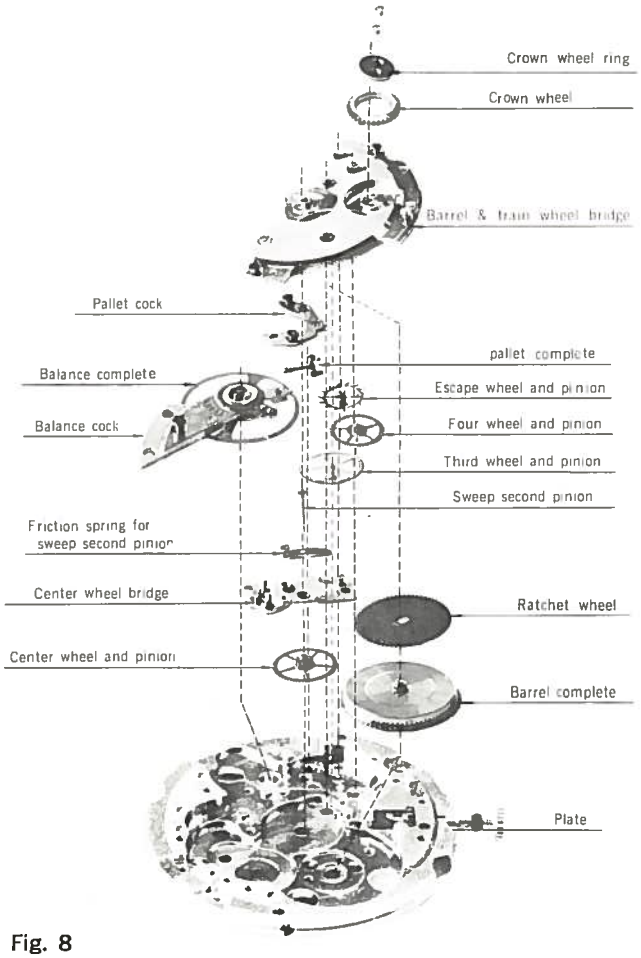


Fig. 8

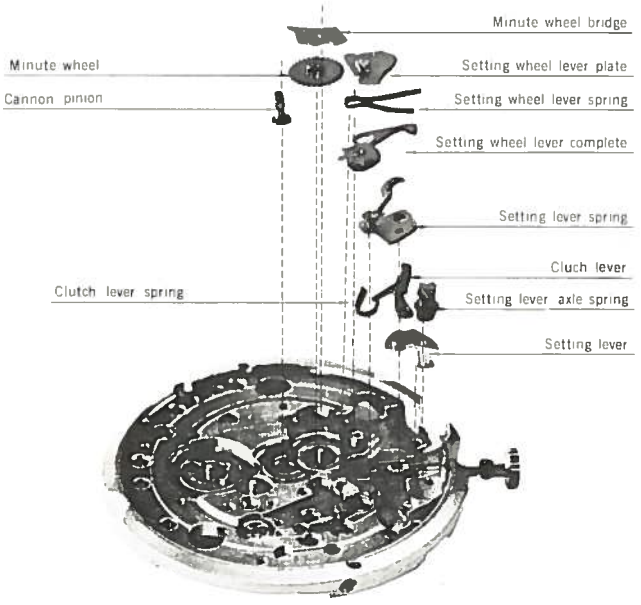


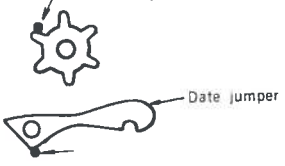
Fig. 9

8305C Disassembly and Assembly

Disassembly

	1 DATE DIAL GUARD	2 DATE JUMPER	3 INTERMEDIATE DATE WHEEL
Method	1 1. Remove date dial guard screws (3) 1 2. Remove date dial guard	2 1. Remove date jumper spring 2 2. Remove date jumper 2 3. Remove date dial	3 1. Remove dial washer 3 2. Remove hour wheel 3 3. Remove intermediate date wheel 3 4. Remove date driving wheel
Remark		Take especial care with the date jumper spring, not to leap off	
Photo			

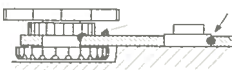
Assembly

	23 DATE DIAL GUARD	22 DATE JUMPER	21 INTERMEDIATE DATE WHEEL
Method	23 1. Place date dial guard 23 2. Fasten date dial guard screws (3) 23 3. Lubricate date corrector wheel complete	22 1. Set date dial 22 2. Set date jumper 22 3. Set date jumper spring	21 1. Lubricate calendar train wheels 21 2. Set date driving wheel 21 3. Insert intermediate date wheel 21 4. Insert hour wheel and dial washer
Remark	Lubricate date corrector wheel 	Take care date jumper spring not to leaf off. Lubricate date jumper 	Lubricate date driving wheel and intermediate date wheel Lubricate cannon pinion

Disassemdly

	4 CANNON PINION AND MINUTE WHEEL	5 SETTING WHEEL LEVER PLATE	6 SETTTING WHEEL LEVER COMPLETE
Method	4-1. Remove cannon pinion 4-2. Loosen the minute wheel bridge screw and remove the bridge 4-3. Remove minute wheel	5-1. Loosen and remove setting wheel lever plate screw 5-2. Remove setting wheel lever plate	6-1. Remove setting wheel lever spring 6-2. Remove setting wheel lever complete
Remark			
Photo			

Assembly

	20 CANNON PINION AND MINUTE WHEEL	19 SETTING WHEEL LEVER PLATE	18 SETTING WHEEL LEVER COMPLETE
Method	20-1. Set cannon pinion 20-2. Lubricate minute wheel pin 20-3. Set minute wheel 20-4. Set minute wheel bridge and fasten bridge screw	19-1. Set setting wheel lever plate 19-2. Fasten setting wheel lever plate screw	18-1. Lubricate setting wheel lever complete 18-2. Set setting wheel lever complete 18-3. Set setting wheel lever spring
Remark	Lubricate minute wheel pin		Lubricate setting wheel lever complete (Moebius A) 

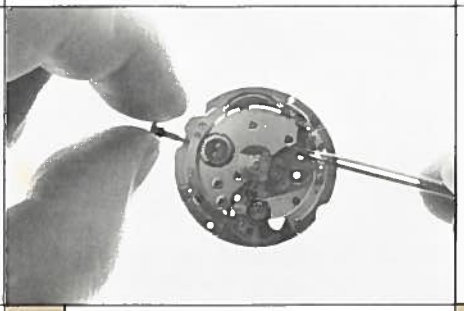
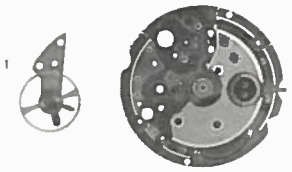
Disassembly

	7 OSCILLATING WEIGHT	8 ROCKING WHEEL BRIDGE	9 ROLLER LOCKING WHEEL AND FIRST REDUCTION WHEEL
Method	7-1. Turn the watch over 7-2. Loosen and remove screw for oscillating weight 7-3. Lifting oscillating weight vertically and remove it from the movement	8-1. Loosen and remove rocking wheel bridge screws (2) 8-2. Remove rocking wheel bridge	9-1. Remove roller rocking wheel 9-2. Remove first reduction wheel 9-3. Remove second reverser idler
Remark			
Photo			

Assembly

	17 OSCILLATING WEIGHT	16 ROCKING WHEEL BRIDGE	15 SECOND REVERSER IDLER AND ROLLER ROCKING WHEEL
Method	17-1. Lubricate ball bearings 17-2. Set oscillating weight	16-1. Set frame 16-2. Fasten rocking wheel bridge screws (2) 15-3. Lubricate roller rocking wheel and first reduction wheel	15-1. Set second reverser idler 15-2. Set first reduction wheel 15-3. Set roller rocking wheel
Remark	Lubricate ball bearings. Fasten screw for oscillating weight exactly	Lubricate pivots of roller rocking wheel and first reduction wheel	

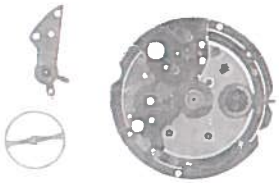
Disassembly

	10 FIRST REVERSER IDLER	11 UNWINDING MAIN-SPRING	12 BALANCE COCK
Method	Insert the hand plier under the idler, and lift it gently to remove the idler. As shown in the photo, cover the idler with a piece of paper so that it will not be sprung	Stem-wind the watch briefly ; disengage the click and second reduction wheel from gear with tweezers ; and slowly unwinding the spring by moving the crown backwards	12-1. Remove balance cock screw 12-2. Remove balance cock slowly
Remark			
Photo			

Assembly

	14 FIRST REVERSER IDLER	13 TESTING	12 BALANCE COCK
Method	14-1. Lubricate first and second reverser idlers 14-2. Set first reverser idler 14-3. Affix first reverser idler spring	13-1. Lubricate barrel complete with arbor, third wheel & pinion, and second reduction wheel 13-2. Turn crown 12 times to wind-up main-spring enough and check the amplitude	12-1. Set balance cock 12-2. Confirm end-shake of balance 12-3. Check the condition of spring with collet
Remark	Lubricate first and second reverser idler axles Be careful to set the wheel right-side up First reverser idler concave and second reverser idler is convex		The hair-spring with collet must be checked thoroughly

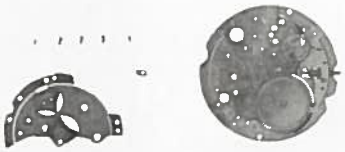
Disassembly

	13 BALANCE	14 DIASHOCK FRAME	15 PALLET
Method	13 1. Loosen stud screw and remove stud from balance cock 13–2. Turn regulator key and remove balance	14 1. Remove diashock springs from plate and balance cock 14–2. Remove hole jewel with frame, and clean it with benzine or trichlorethylene	15–1. Remove pallet cock screws (2) 15–2. Remove pallet cock 15–3. Remove pallet
Remark	When removing balance, be careful not to distort the shape of the hairspring out of order	Cleaning solution must be newly opened Cleaning must be done by brush	
			

Assembly

	11 BALANCE	10 DIASHOCK FRAME	9 PALLET
Method	11–1. Set balance on balance cock 11–2. Turn regulator key so that hair spring is held 11–3. Fasten stud screw so that stud head may be kept above stud holder	10–1. Set diashock frame with hole jewel on cap jewel placed with flat surface upward 10–2. Lubricate it holding tweezers 10–3. Set diashock frames with springs on balance cock and plate	9–1. Lubricate pallet jewels 9–2. Set pallet 9–3. Set pallet cock 9–4. Fasten pallet cock screws
Remark		Lubrication (Moebius A) Max. 1/2 (cap jewel diameter) Min. 1/3 (cap jewel diameter)	Lubricate pallet jewels. (Moebius Chronometers) Fasten screws after confirming that pallet pivot has been set correctly

Disassembly

	16 CROWN WHEEL RING	17 BARREL AND TRAIN WHEEL BRIDGE	18 TRAIN WHEELS
Method	16-1. Remove crown wheel ring screws (2) 16-2. Remove crown wheel ring 16-3. Remove crown wheel	17-1. Remove click screw and click 17-2. Remove bridge screws (3) 17-3. Remove bridge screw, (short) 17-4. Remove bridge	Remove sweep second pinion, and third, fourth and escape wheels
Remark		The bridge screw (short), is visibly shorter than the bridge screw	
Photo			

Assembly

	8 CROWN WHEEL	7 BARREL AND TRAIN WHEEL BRIDGE	6 TRAIN WHEELS
Method	8-1. Lubricate crown wheel 8-2. Set crown wheel 8-3. Insert crown wheel ring 8-4. Fasten crown wheel ring screws (2)	7-1. Set bridge, inserting pivots into hole jewels 7-2. Fasten bridge screws (3) 7-3. Fasten bridge screw (short) 7-4. Set click	6-1. Set escape wheel & pinion 6-2. Set fourth wheel & pinion 6-3. Set third wheel & pinion 6-4. Lubricate sweep second pinion 6-5. Set sweep second pinion
Remark	Lubricate crown wheel. Make certain crown wheel and winding pinion are in gear before fastening	Be sure to insert bridge screw, (short) Confirm that train wheels rotate smoothly before fastening	Lubricate sweep second pinion (Moebius A)

Disassembly

	19 BARREL COMPLETE	20 FRICTION SPRING FOR SWEEP SECOND PINION	21 CENTER WHEEL AND PINION
Method	19-1. Remove ratchet wheel and barrel complete 19-2. Remove second reduction wheel	20-1. Remove sweep second pinion screw 20-2. Remove friction spring for sweep second pinion	21-1. Remove center wheel bridge screws (2) 21-2. Remove center wheel bridge 21-3. Remove center wheel & pinion
Remark		In handling, be careful to maintain the shape of the friction spring for sweep second pinion	
Photo			

Assembly

	5 SECOND REDUCTION WHEEL AND RATCHET WHEEL	4 FRICTION SPRING FOR SWEEP SECOND PINION	3 CENTER WHEEL BRIDGE
Method	5-1. Lubricate second reduction wheel 5-2. Set second reduction wheel 5-3. Lubricate barrel arbor 5-4. Set barrel complete 5-5. Set ratchet wheel	4-1. Place friction spring for sweep second pinion on center wheel bridge 4-2. Fasten screw for friction spring	3-1. Lubricate center wheel & pinion 3-2. Set center wheel & pinion 3-3. Set center wheel bridge 3-4. Fasten bridge screws 3-5. Check end-shake
Remark		Check the position of friction spring for sweep second pinion	Lubricate pivots of center wheel & pinion (Moebius A)

	22 WINDING STEM	23 DIAFIX	
Disassembly Method	22–1. Remove setting lever spring 22–2. Remove clutch lever spring 22–3. Remove clutch lever 22–4. Remove setting lever axle spring 22–5. Remove setting lever 22–6. Remove winding stem 22–7. Remove winding pinion 22–8. Remove clutch wheel	23–1. Remove diafix springs 23–2. Remove cap jewels	Clean all parts disassembled. (For details refer to CLEANING)
Remark			
Photo			

	2 WINDING STEM	1 DIAFIX	
Assembly Method	2–1. Set clutch wheel 2–2. Set winding pinion 2–3. Set winding stem 2–4. Set setting lever 2–5. Set setting lever axle spring 2–6. Set clutch lever 2–7. Set clutch lever spring 2–8. Set setting lever spring	1–1. Insert cap jewels into plate and barrel & train wheel bridge 1–2. Set diafix springs	
Remark	Lubricate clutch wheel, winding stem, and setting lever axle	Lubricate diafix Moebius A Dia. of cap jewel Max.: 1/2 Min.: 1/3	

9011G (Stopwatch 1/5 second, 60 minutes, accumulated)

1. Specifications

Casing diameter	40.25 mm
Height	7.35 mm
Vibrations per hour	18,000

2. Operation

Starting and stopping are by pushing the release button. So long as pushing it only, the hands can not be returned to zero position. Accordingly, counted time is accumulated. Hands returning is by pushing the button on the left of the release button after stopping.

3. Motion of hands

The second hand gives 1/5 second and makes one rotation each 60 seconds.
The minute hand makes one rotation each 60 minutes.

4. Mechanisms

4-1 *Mechanism of indicator device*

By means of springs, the heart connects the following parts; the minute hand to the center wheel and pinion, and the second hand to the sweep second wheel and pinion.
When the button is pushed for hands returning, the hammer rotates the hearts and returns the hands back to zero position. (Fig. 2)

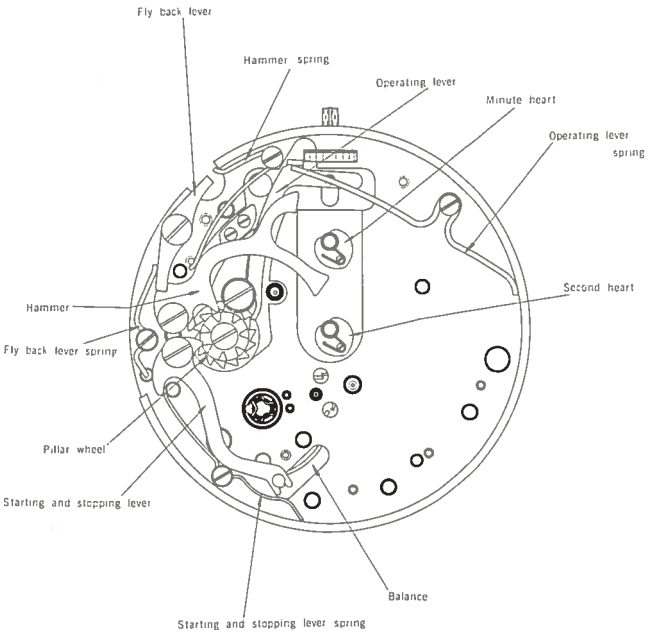


Fig. 1

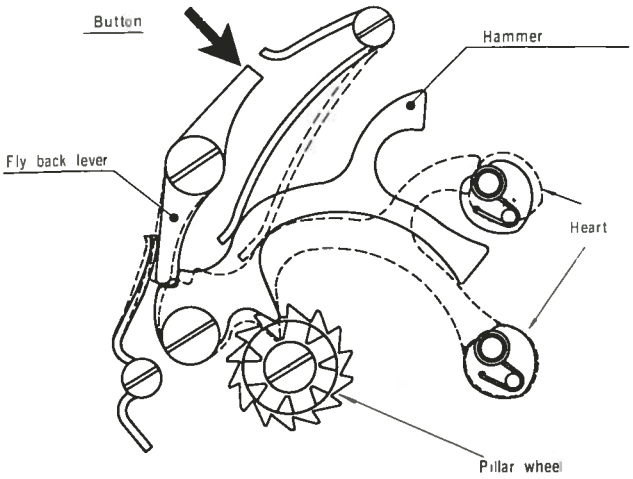


Fig. 2

4-2 *Mechanism of starting and stopping device*

As the start-stop button is pushed, the rotation of the pillar wheel through the operating lever action moves the starting and stopping lever.

The starting and stopping lever either is pressed against the balance, stopping the hands, or is pulled away from it, starting the hands. (Fig. 3)

4-3 *Mechanism of hands returning device*

When the hammer is set at a groove of the pillar wheel (state of stopping) and then push button is pressed, the fly-back lever will release the movement of the hammer, which will then strike the two hearts; the hands will return to zero position.

When the hammer is on a column of the pillar wheel, the hands will not return even if the button is pressed.

5. Disassembly and Assembly
See p. 122～p. 125

6. Checking

1. Starting, stopping and hands returning.
2. Amplitude of balance at the start.
3. Position of second and minute hands, in returning state.
4. Winding.

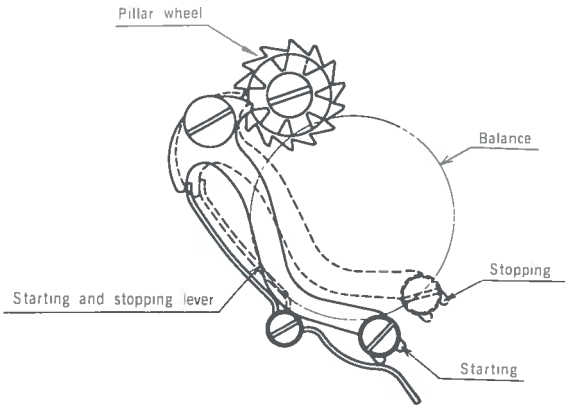


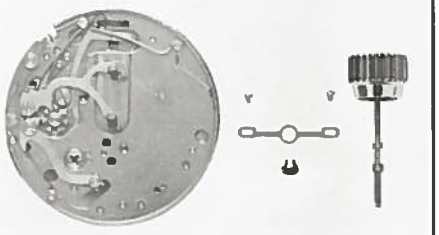
Fig. 3

Relative positions of the hammer and starting and stopping lever against the pillar wheel.

	Hammer	Starting and stopping lever
Starting	On the column, and separated from hearts	Into the groove, and separated from balance
Stopping	At the groove and ready to drop, and still separated from hearts	On the column, and stopping balance
Hands Returning	Fly back lever is freed and it strikes hearts; into the groove	Same as above

9011G (Disassembly and Assembly)

Disassembly

	1 MOVEMENT FROM CASE	2 DIAL PLATE	3 CLUTCH WHEEL
Method	1) Remove winding stem by loosening winding stem holder screw on the winding stem tube of the case 2) Remove back cover and bezel with glass 3) Remove case screws (2 pcs.) and take out movement from the case	1) Remove second hand 2) Remove minute hand. (Note : compared to the wrist watch, second hand and minute hand are fairly strongly mounted ; it is advisable that a special tool be used for disassembling the hands) 3) Remove dial screws (2 pcs.) and then remove dial plate	1) Remove screws for clutch wheel spring (2 pcs.), and then clutch wheel spring 2) Remove clutch wheel
Remark			
Photo			

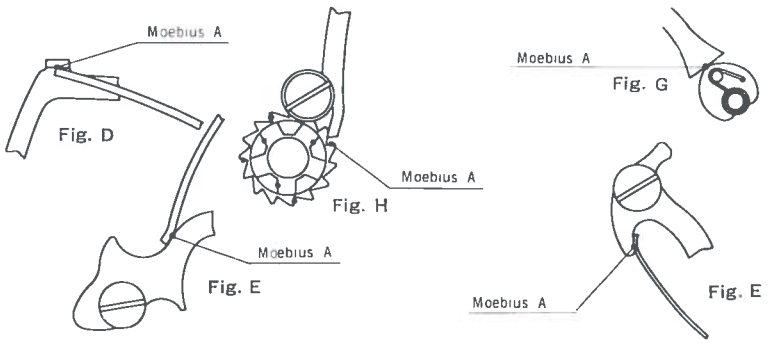
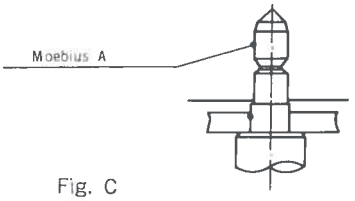
Assembly

	10 SET MOVEMENT IN CASE	9 MINUTE AND SECOND HANDS	8 CLUTCH WHEEL
Method	1) Set movement in case 2) Lubricate winding stem at square portion (Moebius A) and set winding stem 3) Fasten winding stem holder screw. (Note : Be careful that release button does not rub against winding stem tube) 4) Fasten case screws (2 pcs.) and fix movement in case	1) Set dial on movement and fasten screws (2 pcs.) 2) Set minute hand 3) Set second hand (Note : Be careful to fix strongly minute and second hands, so that these will not become loose by the shock of hands returning)	1) Set clutch wheel 2) Set clutch wheel spring and fasten screws (2 pcs.)
Remark			

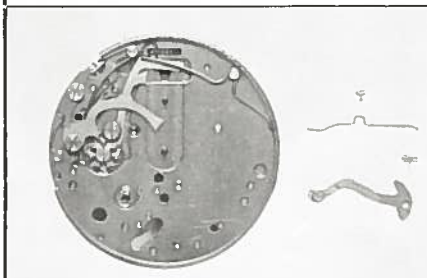
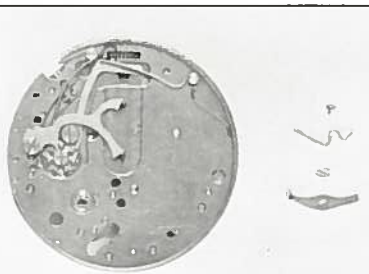
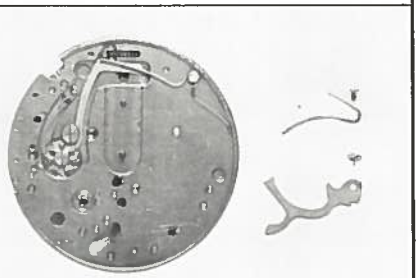
Disassembly

		4	**HEARTS**
Method			1) Remove second heart 2) Remove minute heart
Remark			
Photo			

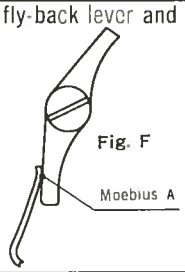
Assembly

7	**LUBRICATION ON CONTACT POINTS OF THE FOLLOWING WITH MOEBIUS A**	6 **HEARTS**
Method	1) Operating lever and operating lever spring (See Fig. D.) 2) Hammer and hammer spring (See Fig. E.) 3) Starting and stopping lever and starting and stopping lever spring (See Fig. F.) 4) Hammer and minute heart and second heart (See Fig. G.) 5) Pillar wheel : a) at 3—4 points where operating lever contacts ratchet part (See Fig. H.) b) at 3—4 boints where hamrner contacts column (See Fig. H.)	1) Lubricate pivots of center wheel and pinion and sweep second wheel and pinion (see Fig. C Moebius A) 2) Set minute heart and second heart (Note : the longer one is the second heart)
Remark		 Fig. C

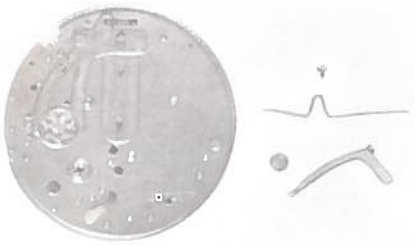
Disassembly

	5 STARTING AND STOPING LEVER	6 FLY-BACK LEVER	7 HAMMER
Method	1) Remove screw and then starting and stopping lever spring 2) Remove screw and starting and stopping lever	1) Remove screw and fly-back lever spring 2) Remove screw and fly back lever	1) Remove screw and hammer spring 2) Remove screw and hammer
Remark			
Photo			

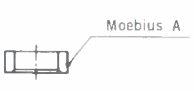
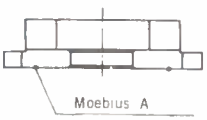
Assembly

	5 STARTING AND STOPING LEVER	4 FLY-BACK LEVER	3 HAMMER
Method	1) Set starting and stopping lever and fasten screw 2) Set starting and stopping lever spring and fasten screw	1) Set fly-back lever and fasten screw 2) Set fly-back lever spring and fasten screw	1) Set hammer and fasten screw 2) Set hammer spring and fasten screw
Remark		Lubricate fly-back lever and spring  Fig. F Moebius A	

Disassembly

	8 OPERATING LEVER	9 PILLAR WHEEL	
Method	1) Remove screw and operating lever spring 2) Remove screw and operating lever	1) Remove screws (2 pcs.) and pillar wheel jumper 2) Remove screw and pillar wheel 3) Remove pillar wheel ring	
Remark			
Photo			

Assembly

	2 OPERATING LEVER	1 PILLAR WHEEL	
Method	1) Set operating lever and fasten screw 2) Set operating lever spring and fasten screw	1) Set pillar wheel ring and lubricate (Moebius A, see Fig. A.) 2) Lubricate back side of pillar wheel (Moebius A) and set pillar wheel and fasten screw (see Fig. B.) 3) Set pillar wheel spring and fasten screws (2 pcs.)	
Remark		 Fig. A  Fig. B	

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

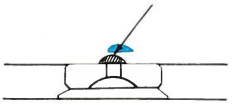
- Sufficient quantity
- Normal quantity
- Extremely small quantity

Note:

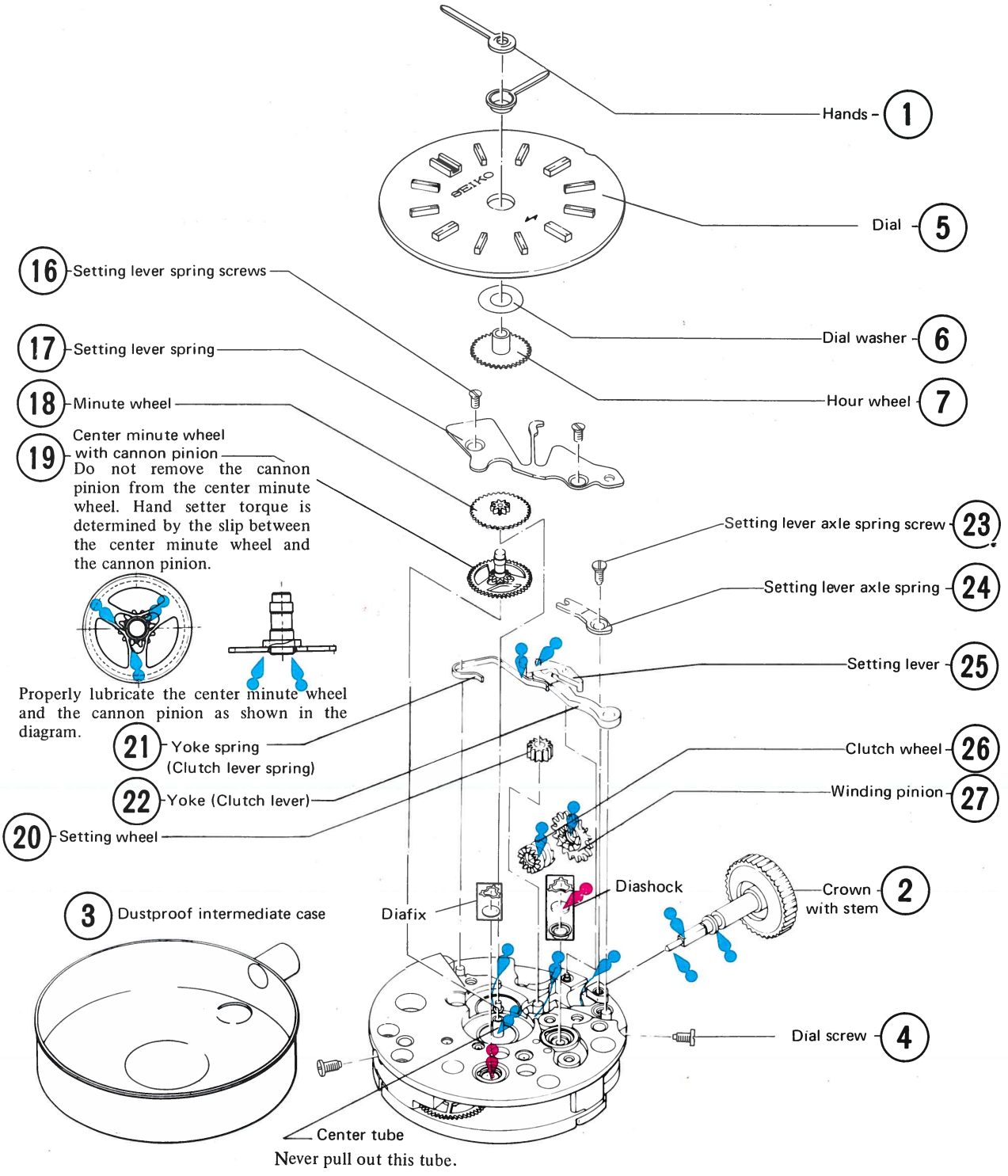
Refrain from lubricating points not so indicated.

Lubrication of SEIKO Watch Oil S-4

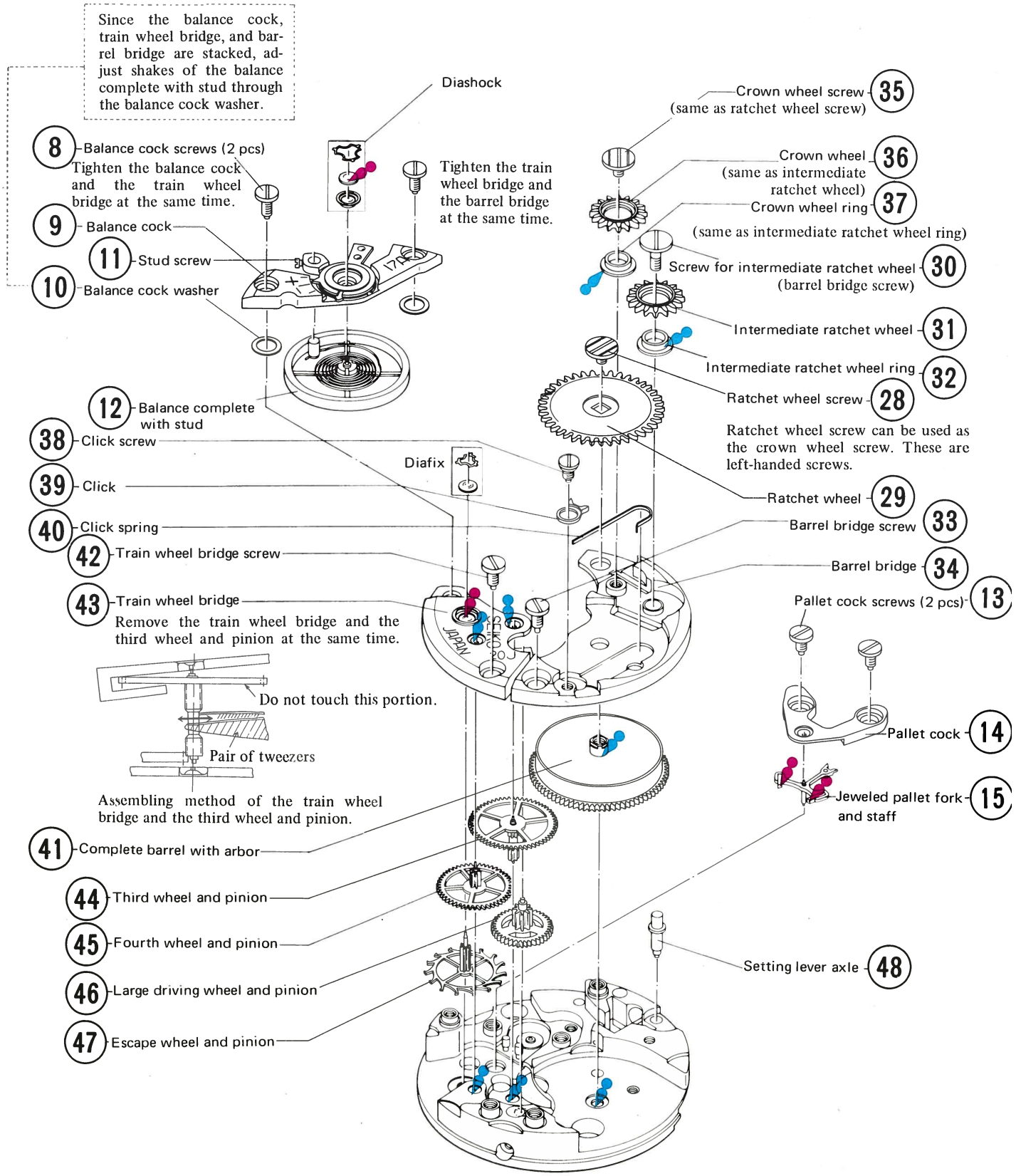
Lubricate the pivot holes of the front train wheel such as the plates, bridges etc. with SEIKO Watch Oil S-4 on the side in which the pivots are inserted as shown in the diagram.



17 A Setting Mechanism



17 A Train Wheel, Escapement and Govenor Mechanism



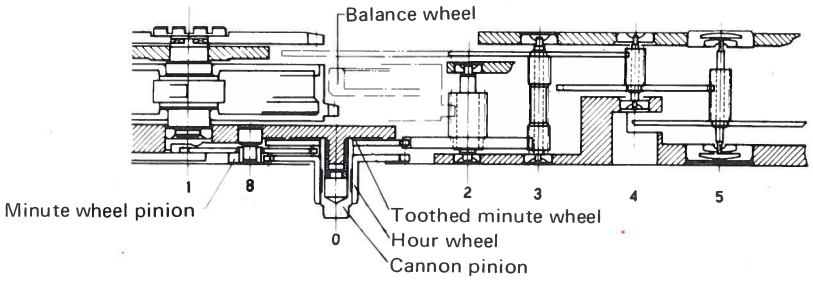
5) Construction

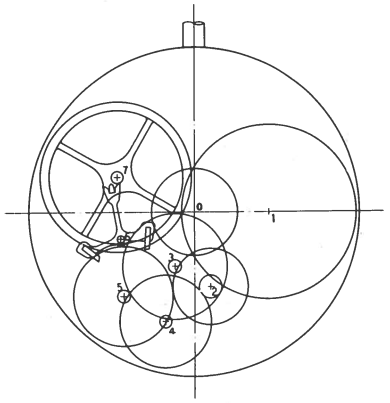
5.-1 *Special train wheel*

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)





1. Barrel
2. Large driving wheel
3. Third wheel
4. Fourth wheel
5. Escape wheel
6. Pallet
7. Balance wheel
8 Minute wheel
0. Center minute wheel

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)

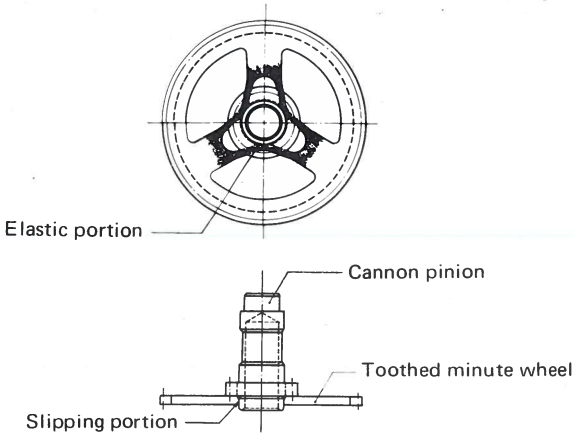


Fig. 2

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)

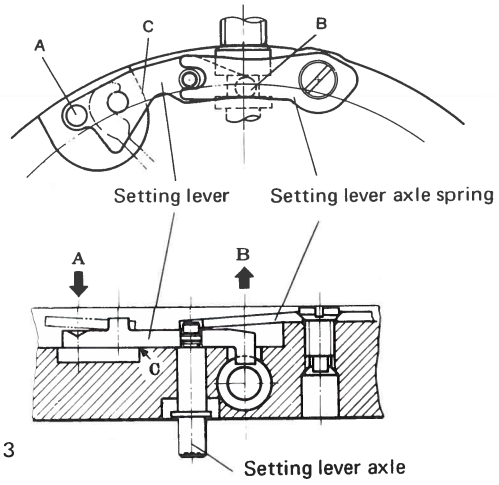
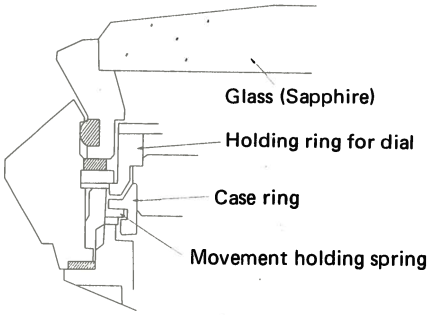


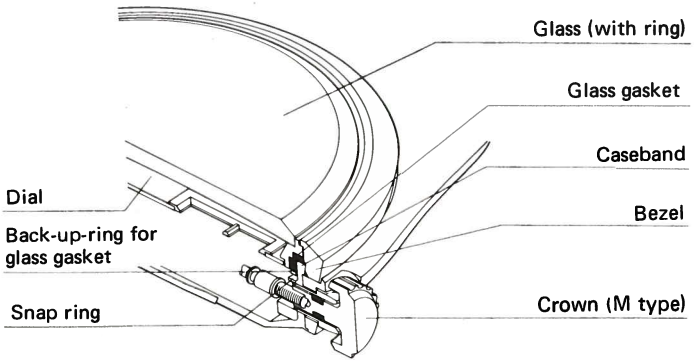
Fig. 3

1. Construction

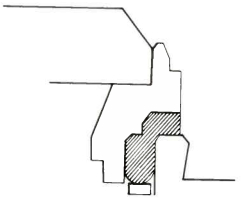
Glass: Hardlex
Case back: One-piece type
Crown: M type



In case of sapphire glass



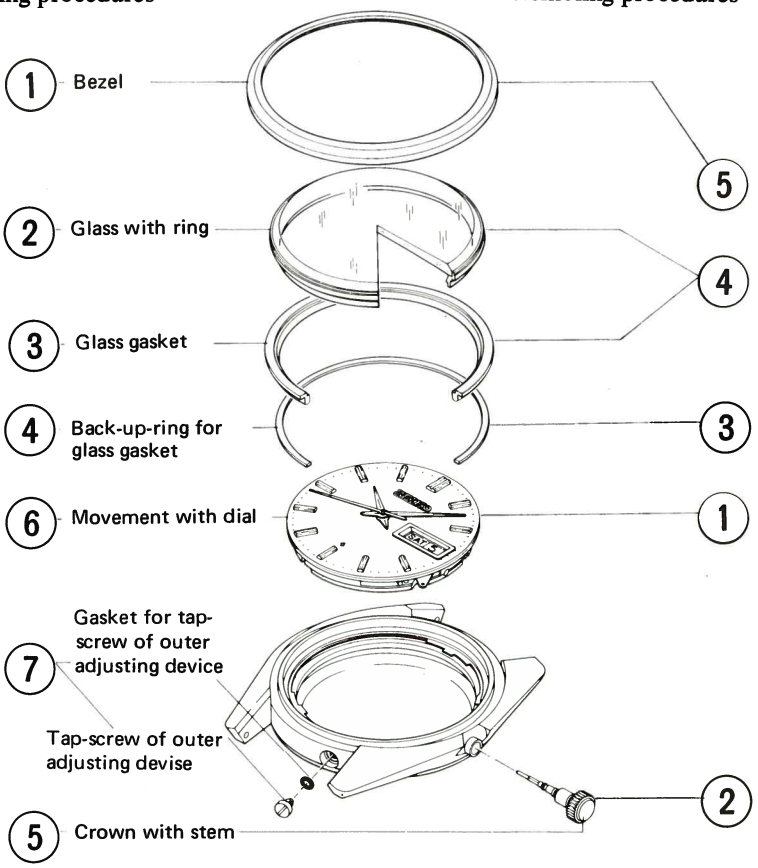
2. Disassembling and Assembling



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

Disassembling procedures

Assembling procedures



This glass can be easily opened with a finger tip.

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

Assemble 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.

Operation for the snap ring is the same as One-piece case–1.

Take out the movement by turning the watch over after turning the snap ring. Operation for the snap ring is the same as the One-piece - 1.

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

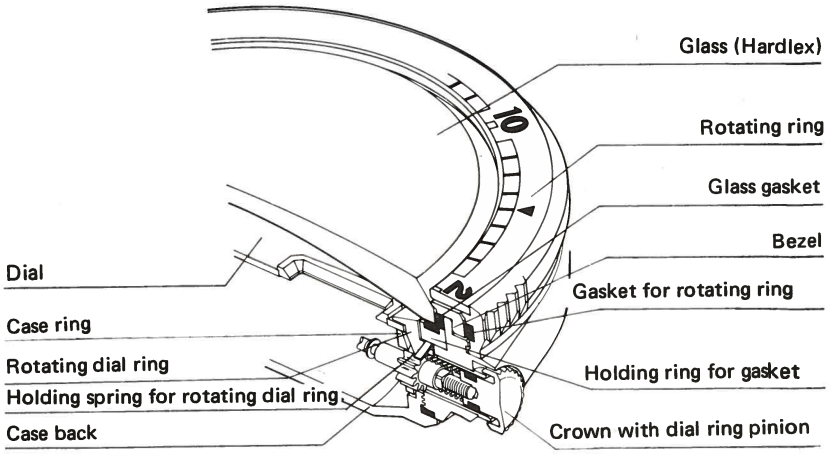
Usually, it is unnecessary to detach the tap-screw of outer adjusting device. The gasket is set on the screw. Some models have no tap-screw of outer adusting device.

Refer to One-piece –1, 3 for removing the winding stem.

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

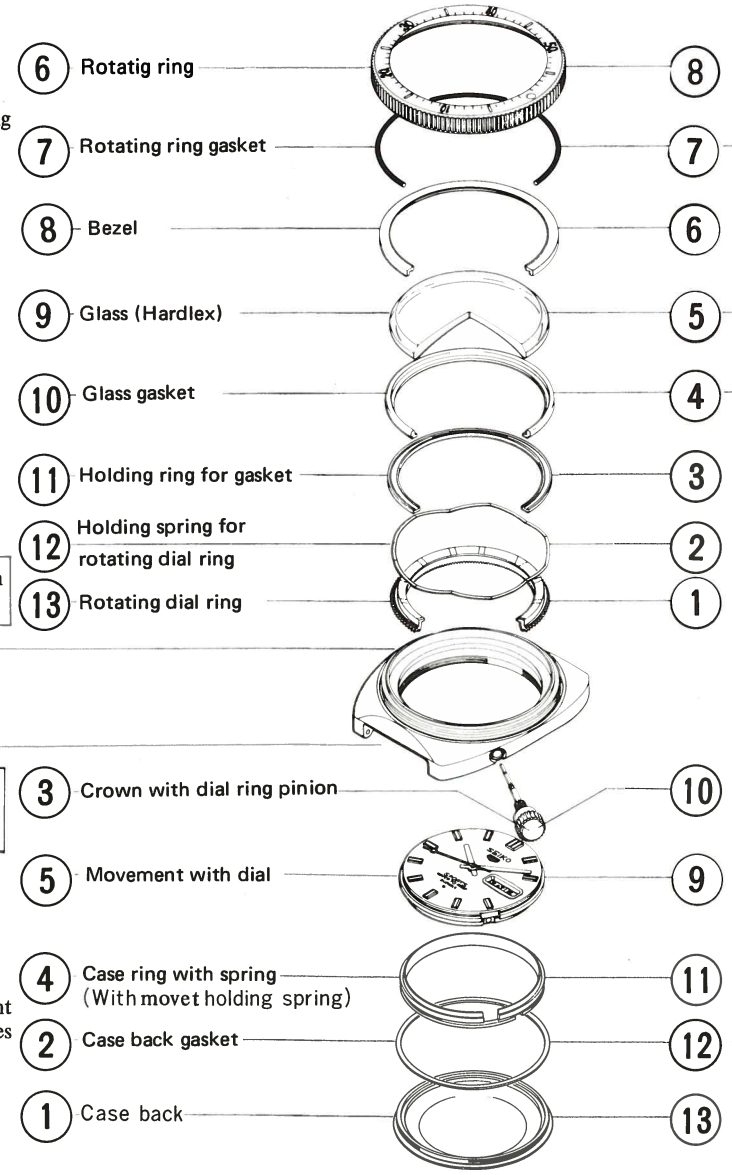
1. Construction

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.

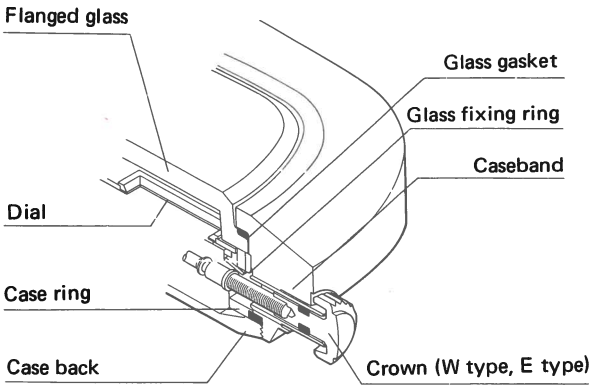
Note) Replace the gasket which is scratched or bent inward.

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



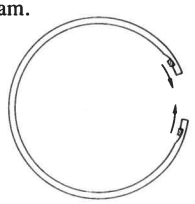
Features
* This construction maintains a water resistant condition by pressing the glass and glass gasket to the caseband through action of the glass fixing ring.
* Water resistant condition is maintained by action of the glass fixing spring which presses the glass and glass gasket to the caseband, tightening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

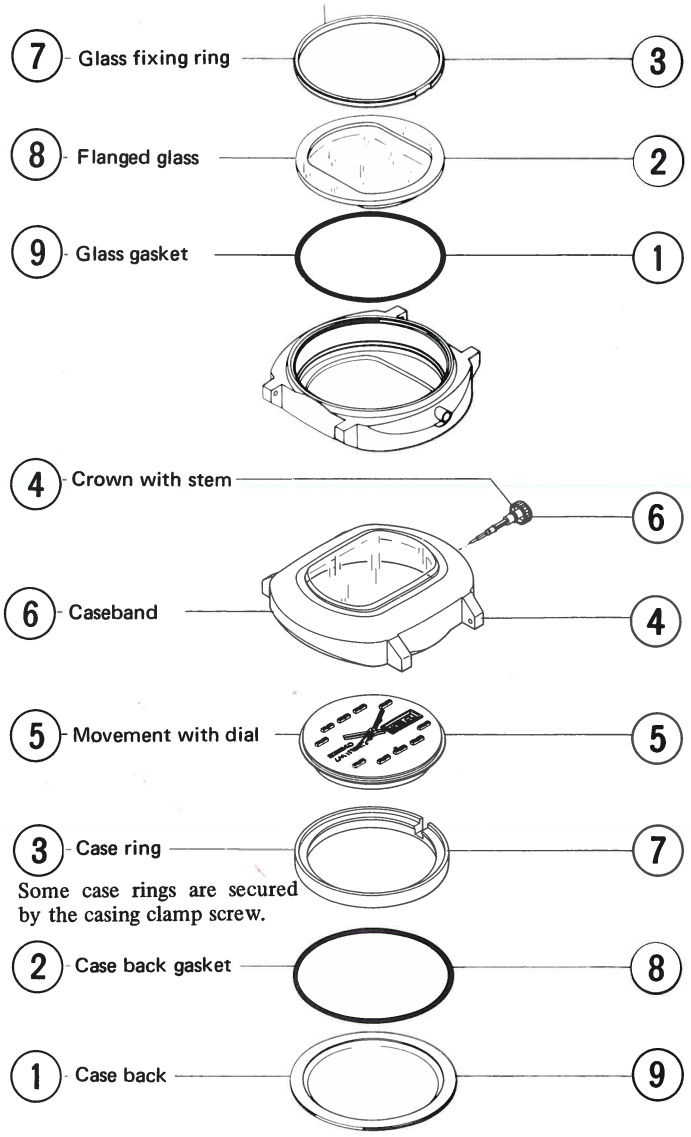
2. Disassembling and Assembling

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)

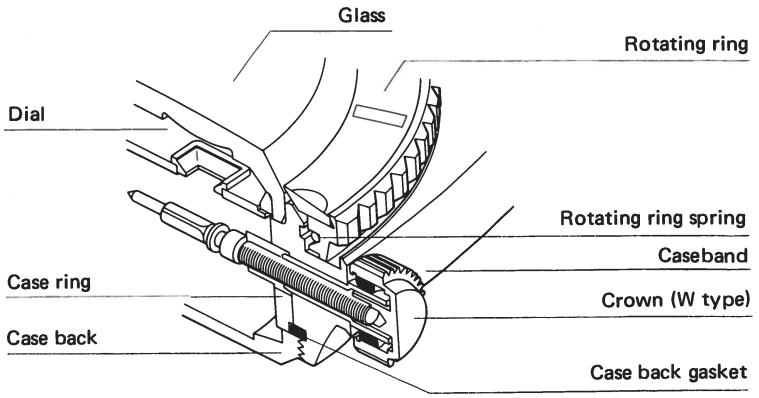
Note) Select a slightly larger Disk than the glass and always spread a vinyl film over it to prevent scratches. Select a Inserting Disk (for glass with tension ring) suitable for the glass fixing ring, then press the glass in, being careful not to damage the winding stem tube.

* 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.

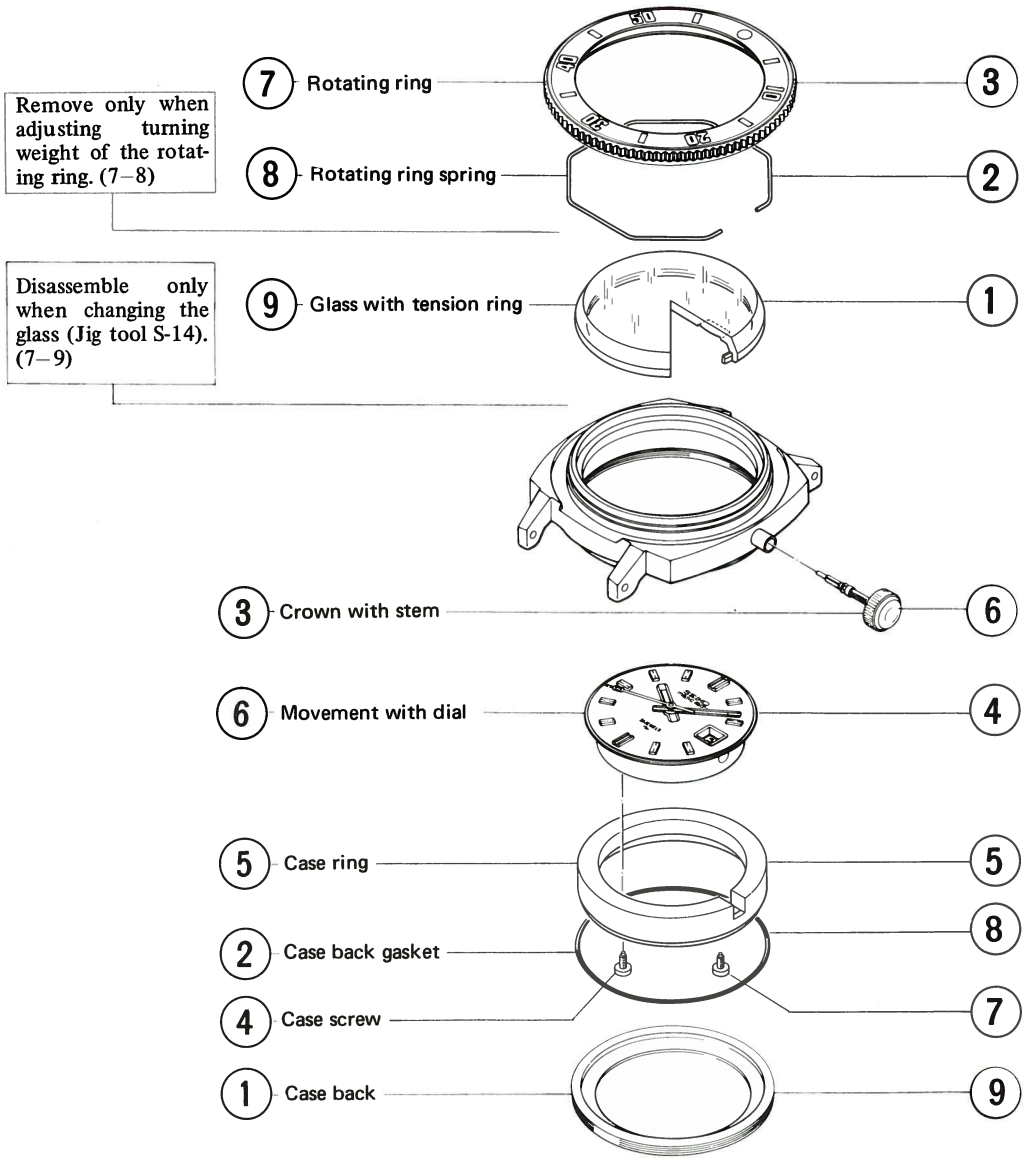
1. Construction

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.

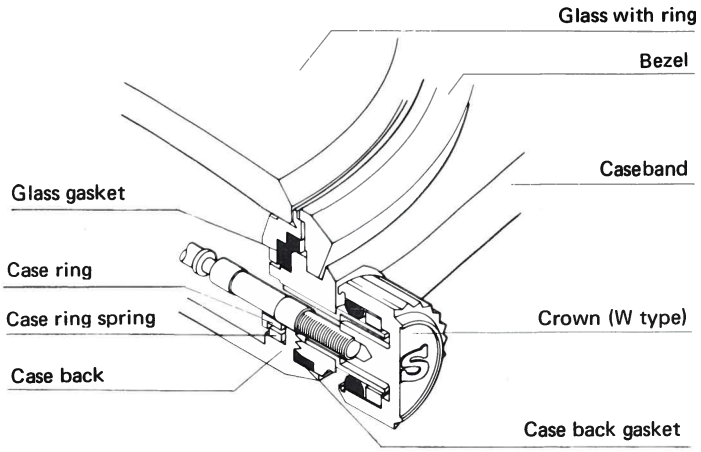
When inserting glass, press it in by using the Inserting Disk (for glass with tension ring)

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.

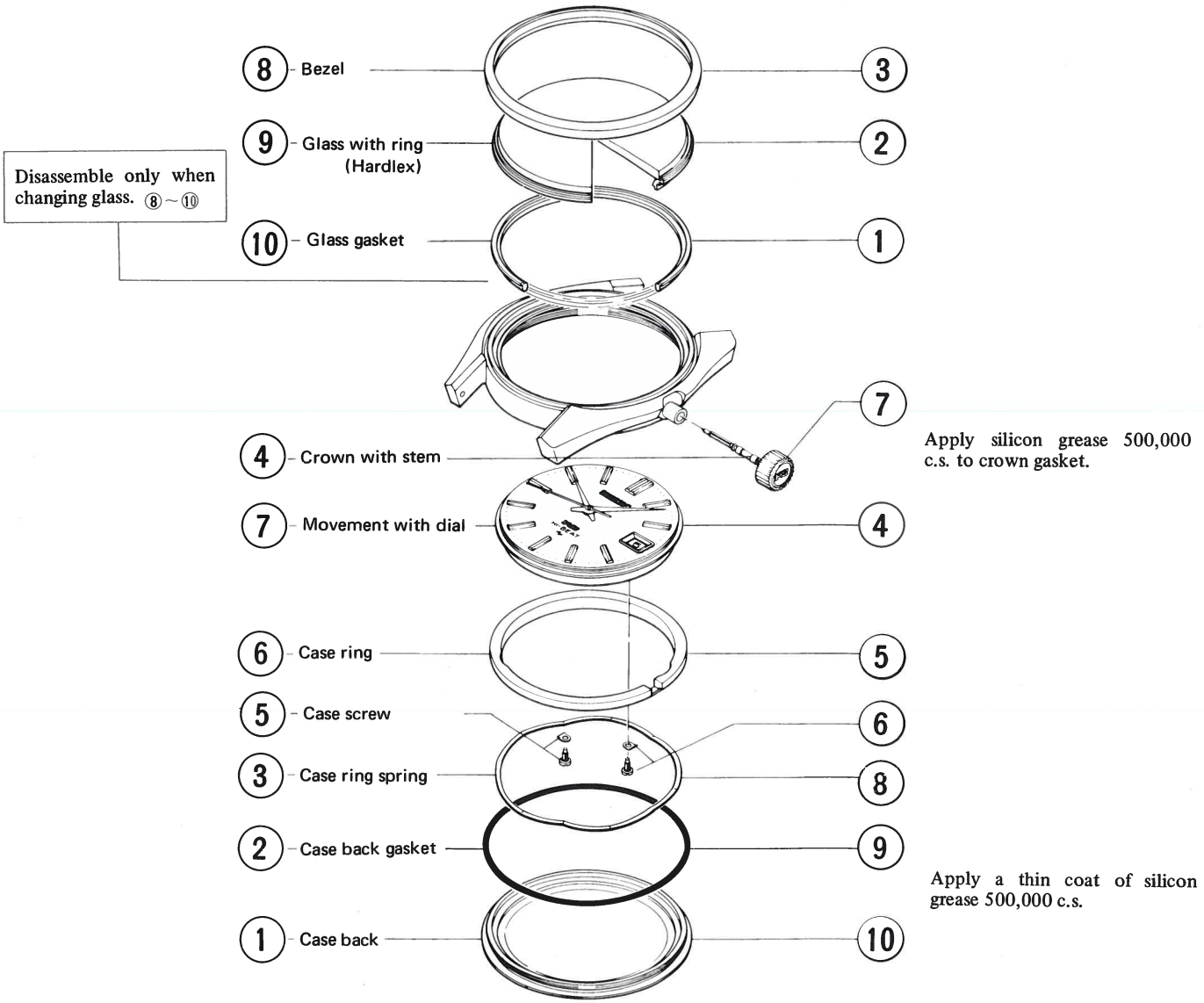
1. Construction

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



2. Disassembling and Assembling

Disassembling procedures **Assembling procedures**

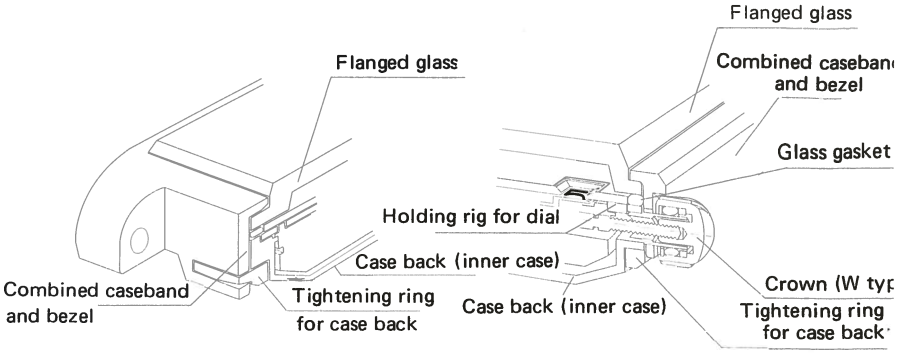


1. Construction

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.

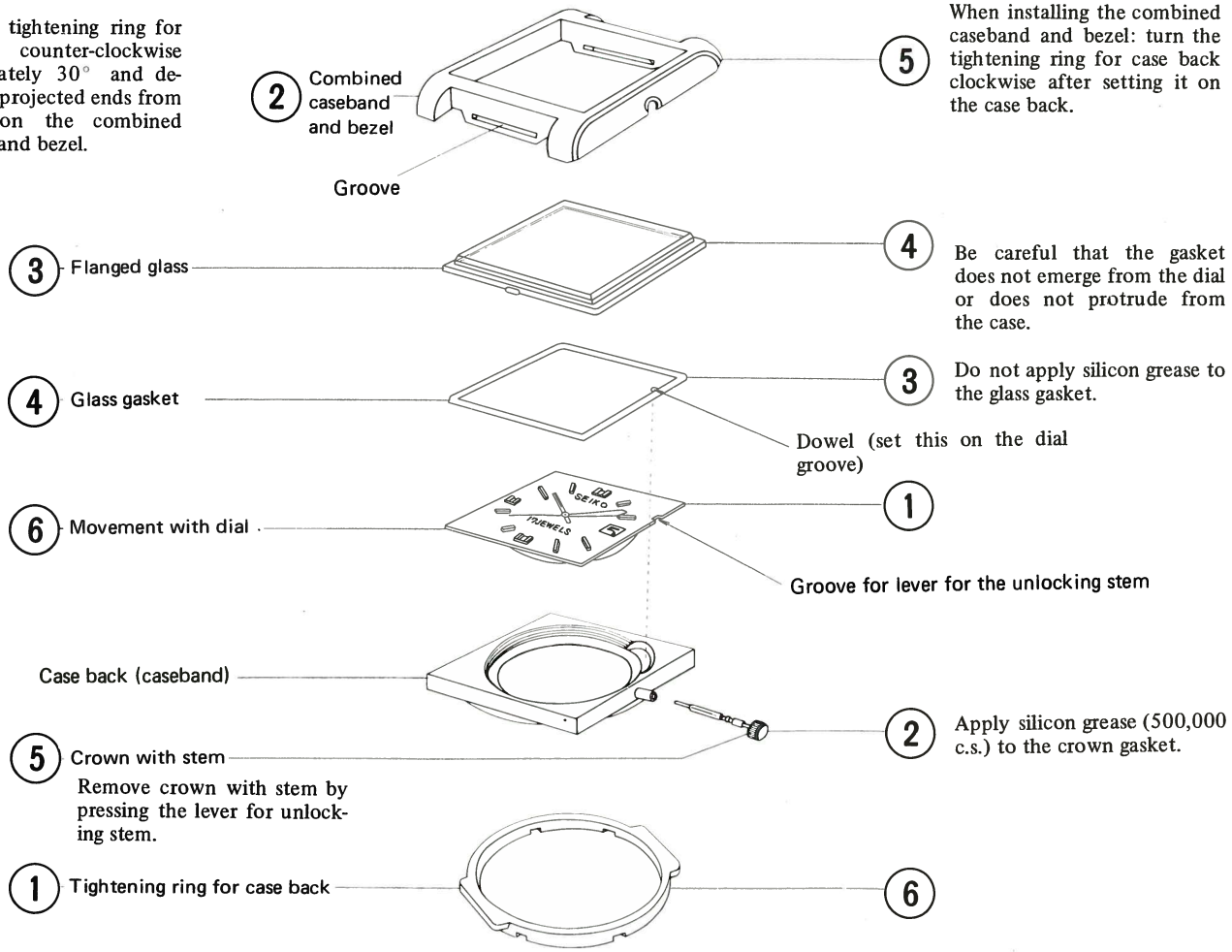


2. Disassembling and assembling

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

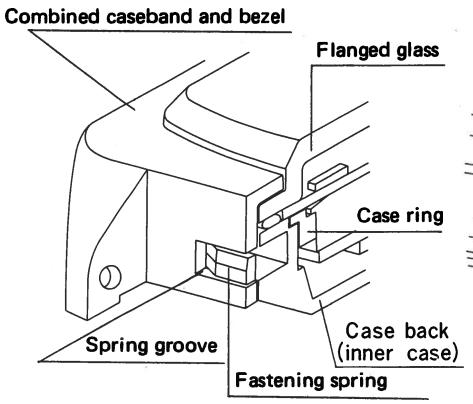


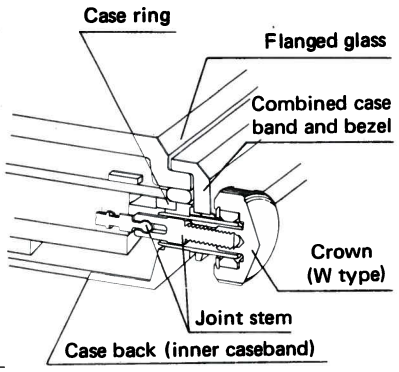
1. Construction

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 conbined caseband and bezel, a water resistant condition is completely maintained, as it simultaneously presses the case back, glass gasket, and flanged glass.



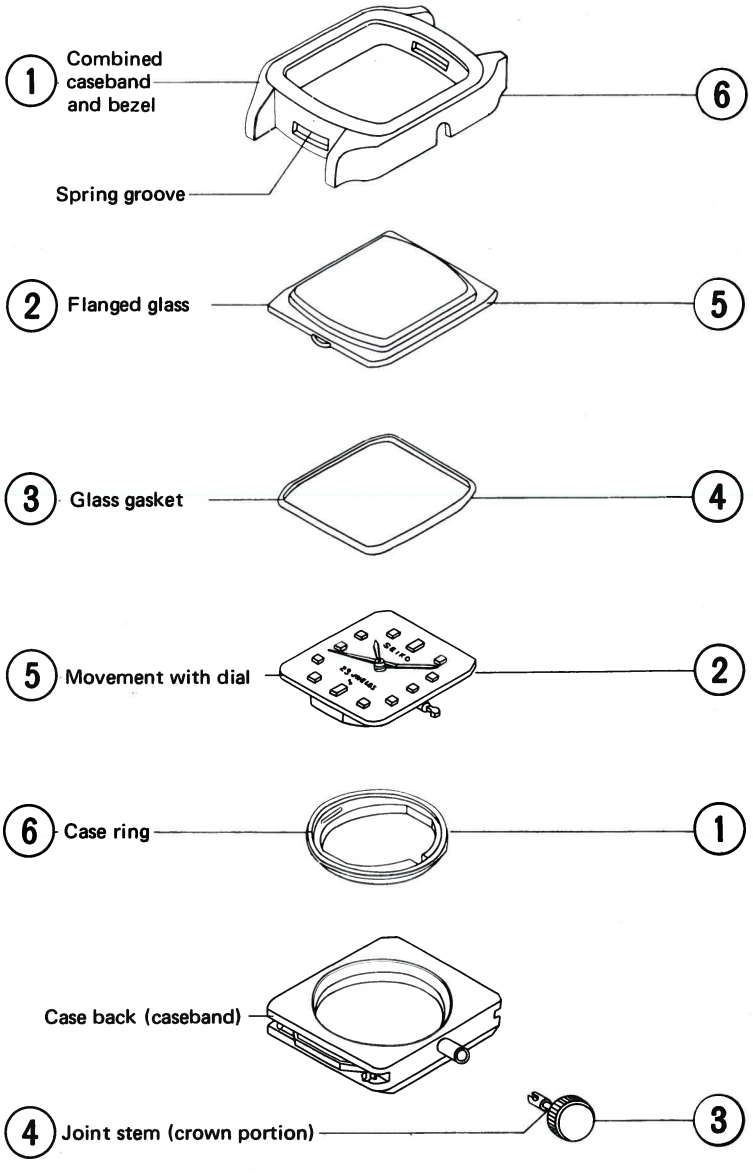


2. Disassembling and assembling

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.

Assembling procedures



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.

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 lightweight, 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. ①-㊻

Assemble by reversing the above order: Figs. ㊻-①

4) Lubrication

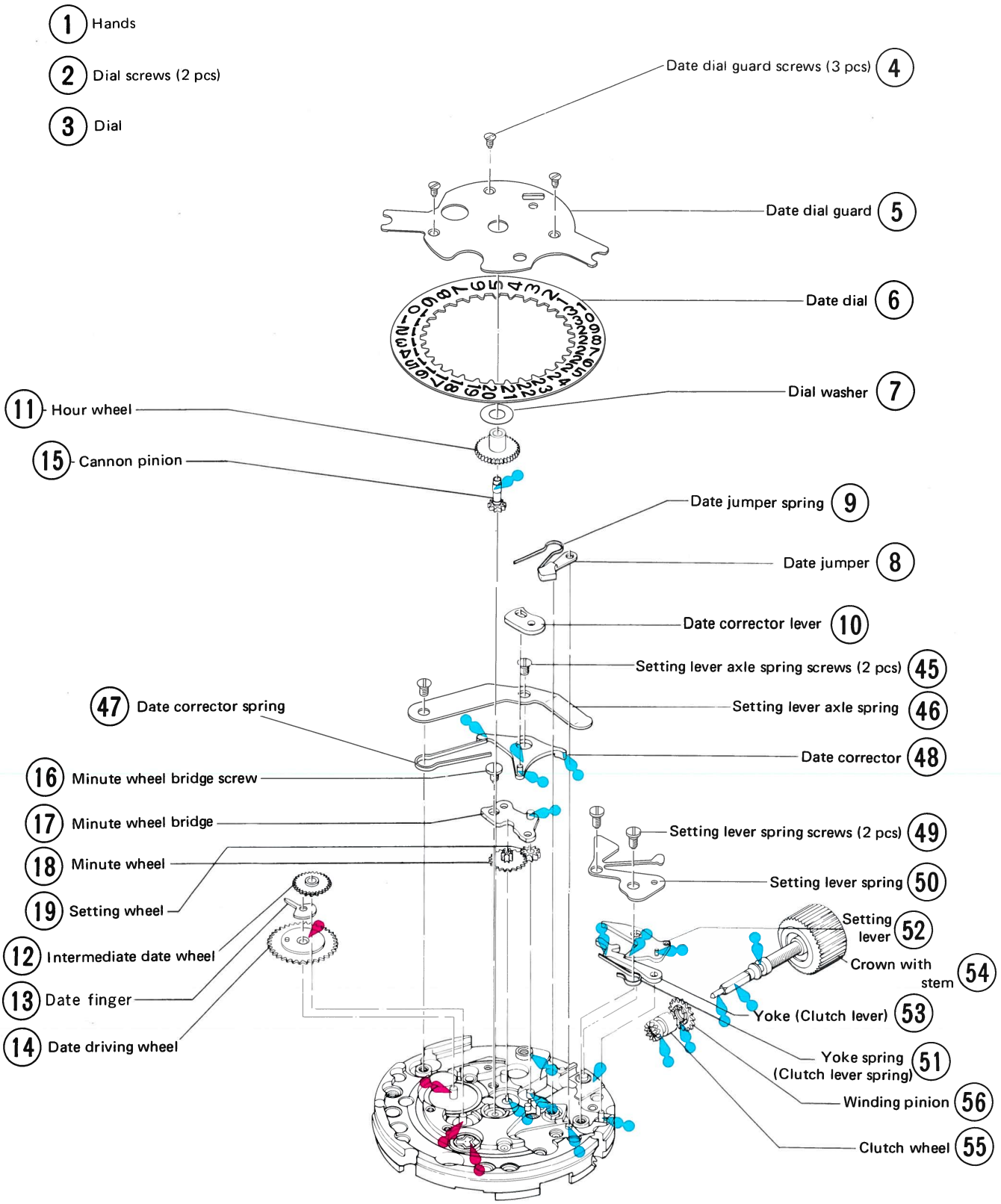
Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and the lubricating points.

Types of oil
- Moebius Synt-A-Lube
- Seiko Watch Oil S-4

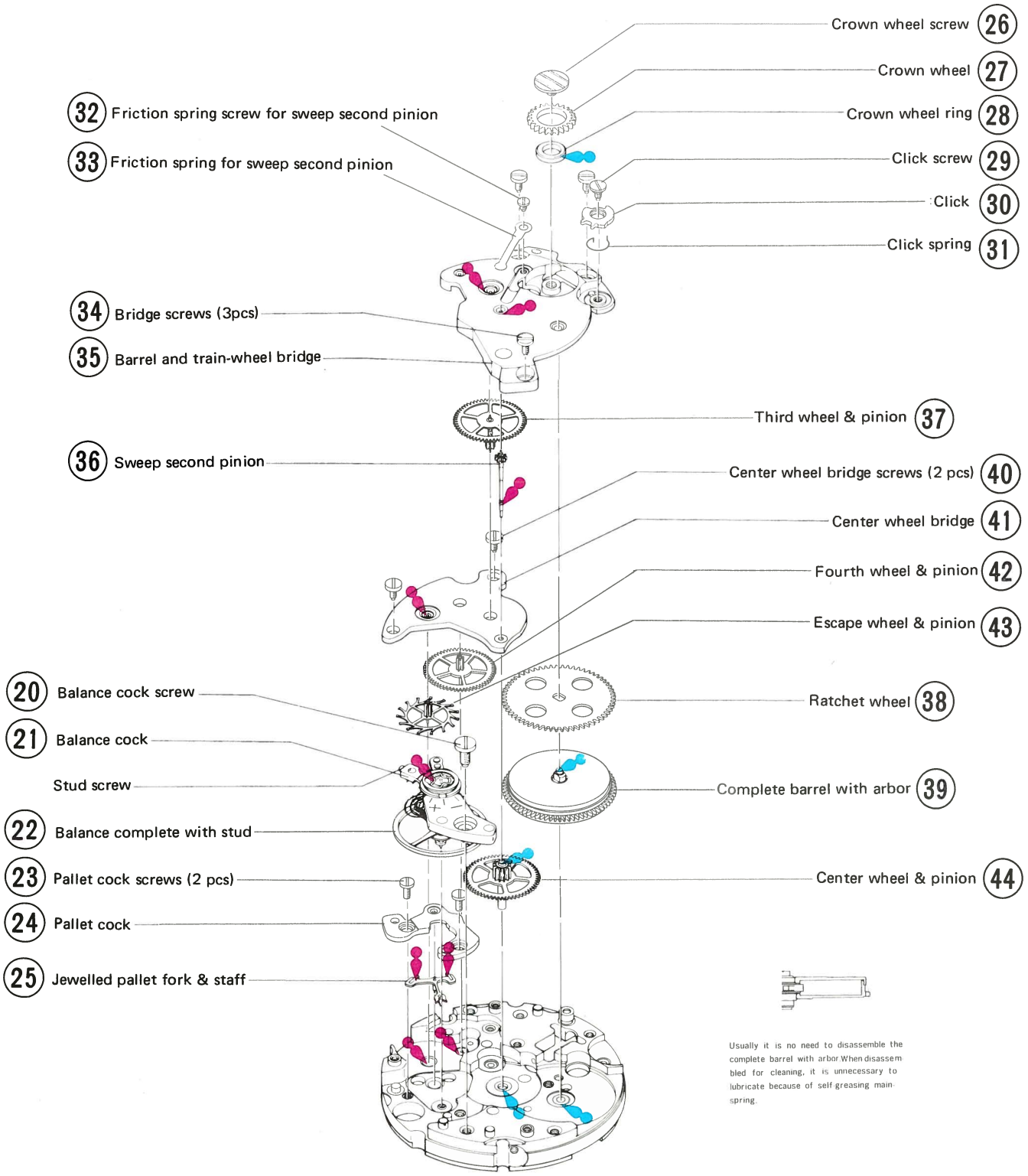
Oil quantity
- Sufficient quantity
- Normal quantity
- Extremely small quantity

Movement

2202A Calendar Setting Mechanism



2202A Train Wheel, Escapement and Governer 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 correnctor 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)

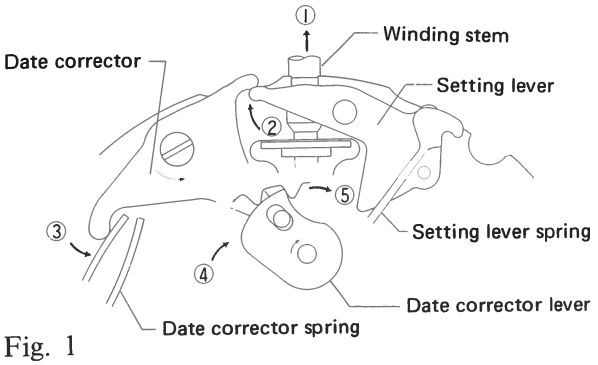


Fig. 1

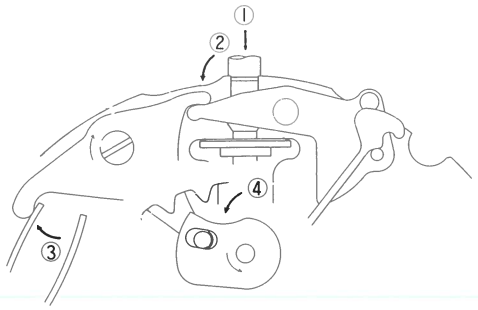


Fig. 2

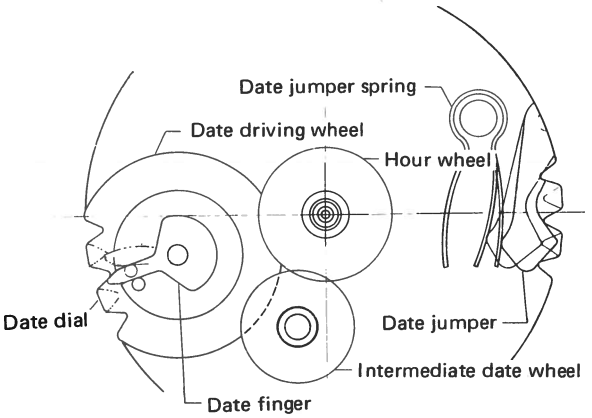


Fig. 3

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 desighed 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

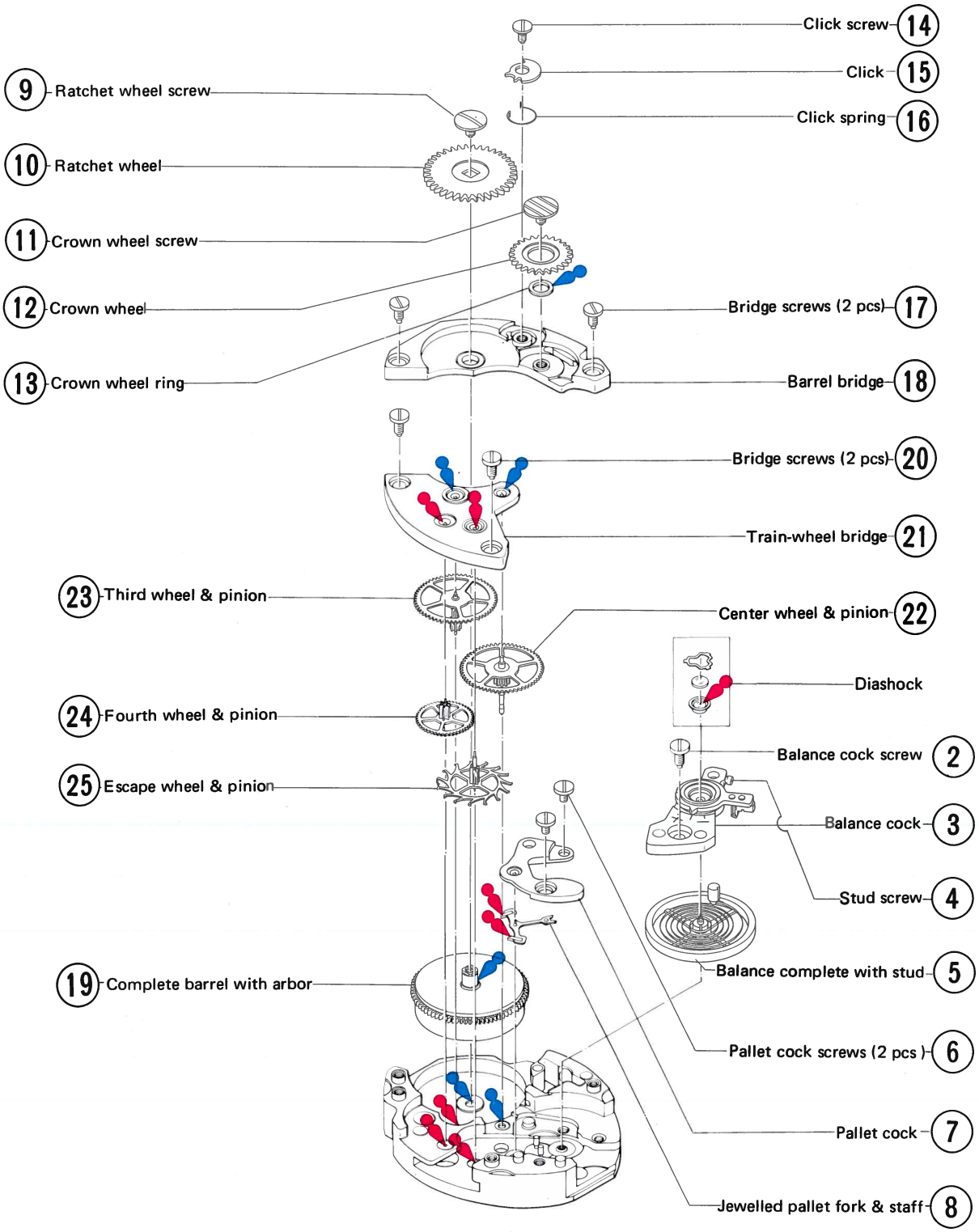
Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and the lubricating points.

Types of oil
- Moebius Synt-A-Lube
- Seiko Watch Oil S-4

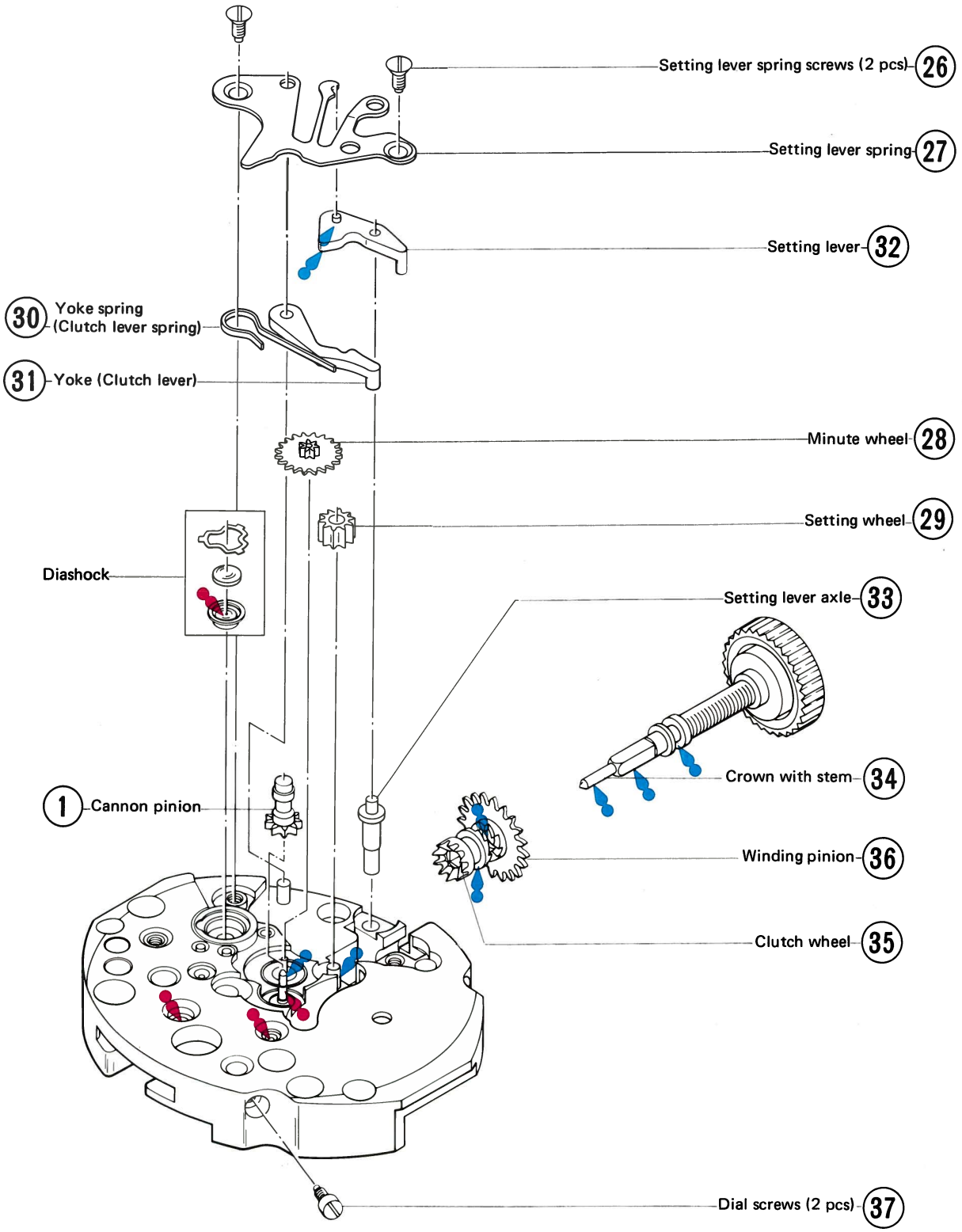
Oil quantity
- Sufficient quantity
- Normal quantity
- Extremely small quantity

Movement

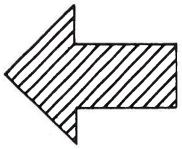
1100A Train Wheel



1100A Setting Mechanism



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.

A. 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.
B. 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

Comfirm the following points for the actually moving watch which is claimed to have stopped during the night.

A. Wind the ratchet wheel 1.5 revolutions after complete release of the mainspring.
B. Set the hands to 10:30 (p. m.), then leave the watch as it is.
C. 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]

[When the number of remaining windings of the mainspring is under 1 winding.]

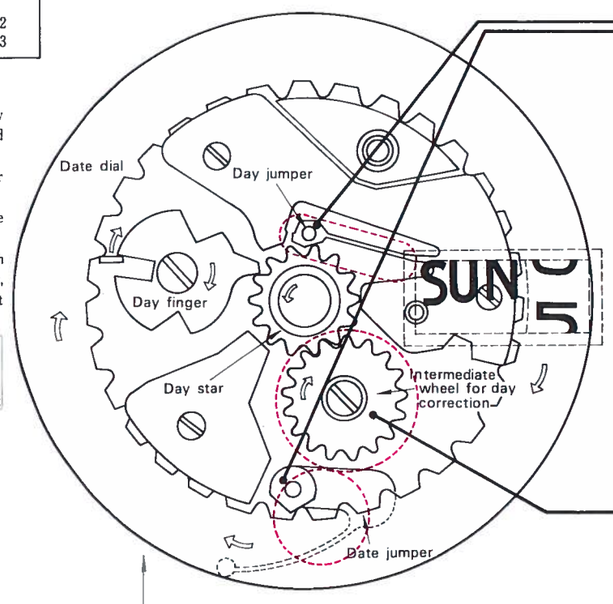
2 When only the Second Hand is in Motion and the Hour Hand and Minute Hand stop During Calendar Shifting.

In this case, inspect the watch accroding to CHECKING PROCEDURES 4, 5, and 8.

[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.

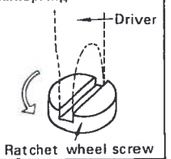


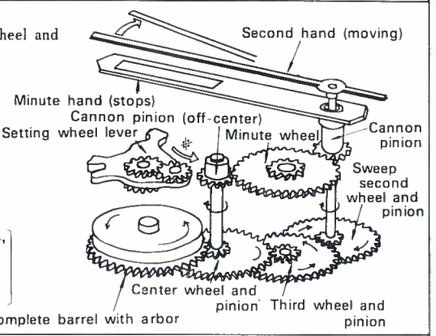
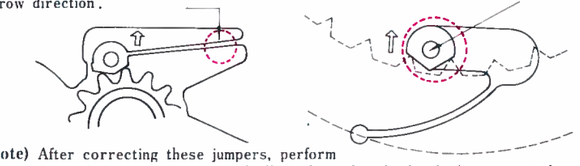
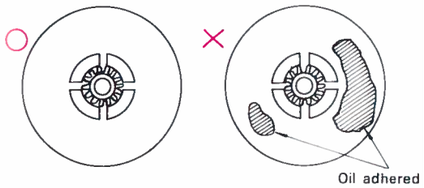
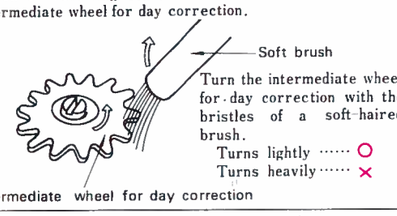
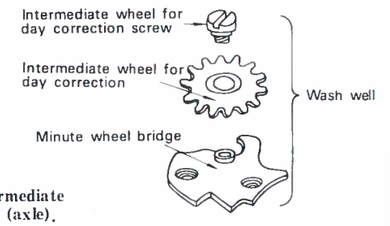
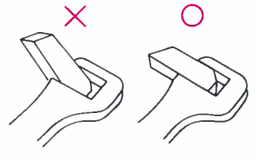
This diagram indicates a stopping condition of calendar shifting.
(A diagram in which the dial and the day star with dial disk are removed).

*Checking the number of remaining windings of the mainspring

1. Pull out the crown to the first or second click.
2. Remove the automatic winding section (oscillating weight section).
3. Firmly hold the ratchet wheel screw with a driver and release the click by using a pair of tweezers.
4. In this condition, gradually turn the ratchet wheel screw counterclockwise until the main spring force is exhausted (releasing the main spring).
5. 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 main spring by confirming the direction of the groove of the ratchet wheel screw.

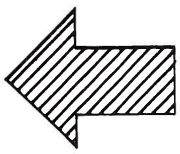


Checking procedure	Checking details	Repairing and checking methods
4	(The cause was due to loosened caulking of the cannon pinion (off-center) attached to the large driving wheel and pinion). (Refer to the diagram on the right)	Replace the large driving wheel and pinions with a new one. **(Note) Never caulk the cannon pinion.** [* When setting the hands, the setting wheel lever meshes with the cannon pinion (off-center).] 
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 (×)..... 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.  Turn the intermediate wheel for day correction with the bristles of a soft-haired brush. Turns lightly ..... ○ Turns heavily ..... ×	When the intermediate wheel for day correction does not revolve smoothly (×)..... 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).

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.

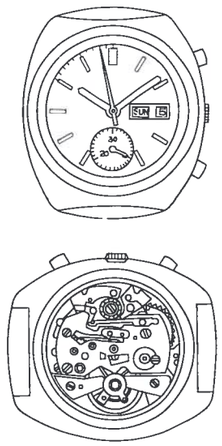
○ **A watch in the following condition is defective.**

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 CHECKIG ON WATCH STOPPING, AND REPAIRING AND ADJUSTING PROCEDURES

(Example of stopping at 58 second position)



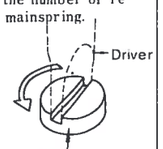
Enlarged diagram

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 Procedure2
Under 1 winding..... Adopt Procedure3

*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.

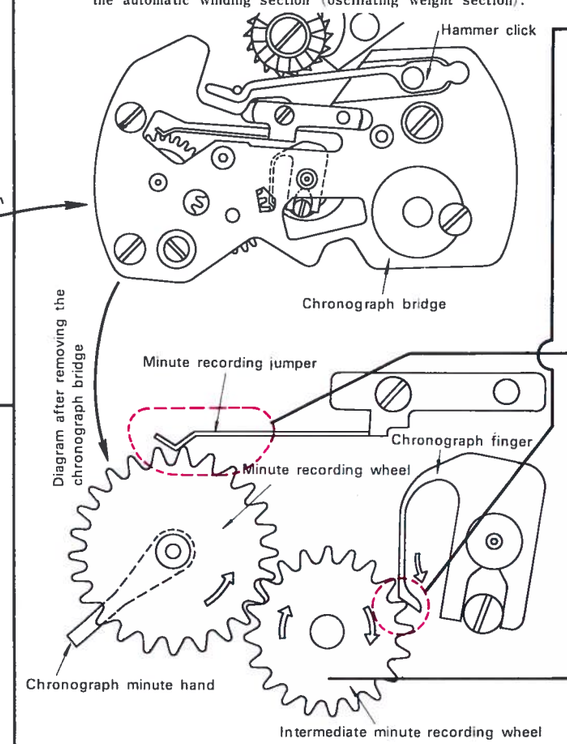


(Note)
It is convenient to count the number of remaining windings of the main spring by confirming the direction of the groove of the ratchet wheel screw.

When the number of remaining windings of the mainspring exceeds 1 – 1.5 windings

2 When the Balance stops at the 58 second Position

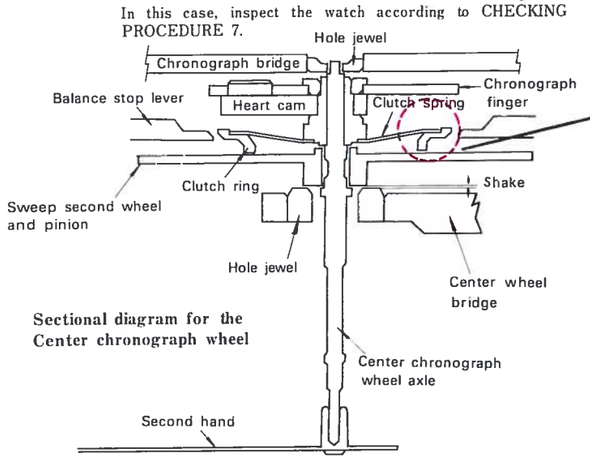
In this case, inspect the watch according to CHECKING PROCEDURES 4 through 6 after removing the case back and the automatic winding section (oscillating weight section).



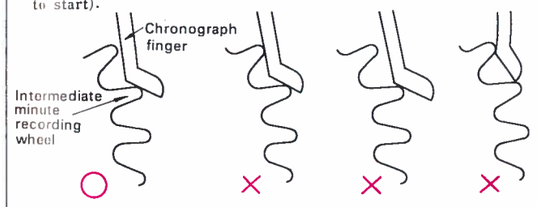
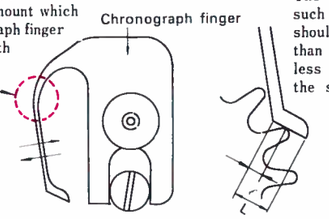
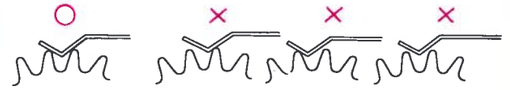
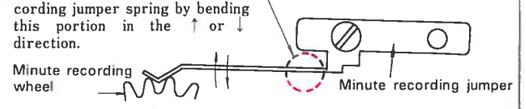
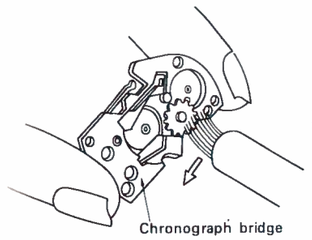
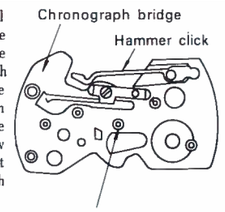
When the number of remaining windings of the mainspring is under 1 winding

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.



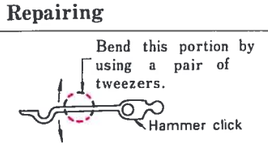
Sectional diagram for the Center chronograph wheel

Checking procedure	Checking details	Repairing and checking methods
4	Check the condition when the chronograph finger contacts the intermediate minute recording wheel (when the minute forwarding is ready to start). 	In case of × 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.  The amount of such contact (ℓ) should be more than 1/4 but less than 1/2 the size of L.
5	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. At 58 – 59 second: Minute recording jumper; Minute recording wheel — At 60 second — Judgment: ○ Cannot be forwarded because the spring of the minute recording jumper is too strong — (Stopping) — Judgment: ×	In case of ×, 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. 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.  Adjust strength of the minute recording jumper spring by bending this portion in the ↑ or ↓ direction.  (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.
6	Remove the chronograph bridge and check on revolving condition of the intermediate minute recording wheel.  Lightly turn the intermediate minute recording wheel with a soft small brush. Turns lightly ..... ○ Turns heavily ..... ×	When the intermediate minute recording wheel turns heavily (×), wash the chronograph bridge with an ultrasonic cleaner. **(Note) Never lubricate the intermediate minute recording wheel.**
7	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. (Note) If the shake of the center chaonograph 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).	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.  Adjust the shake by raising or lowering this hole jewel. (Adjust it on a staking tool or a riveting stake).

General Checking Procedures After Repairing

1. Pushing strength of the hammer button

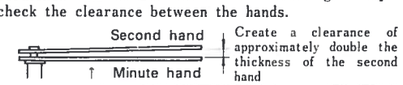
When pushing strength of the hammer button is too heavy, the second hand is reset too fast, causing a defective resetting position. consequently adjust it lightly as far as possible.



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.



(Note) When installing the second hand, use the movement holder (S-500) for 6139A.

Oiling 1944A

1. Lubricating points and types of oil

Refer to { Front train wheel .....Fig. 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
: Sufficient quantity

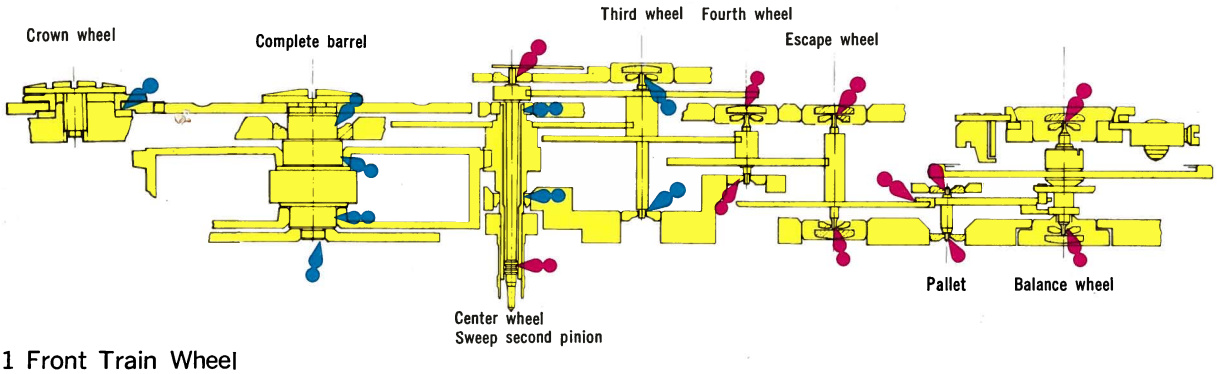


Fig. 1 Front Train Wheel

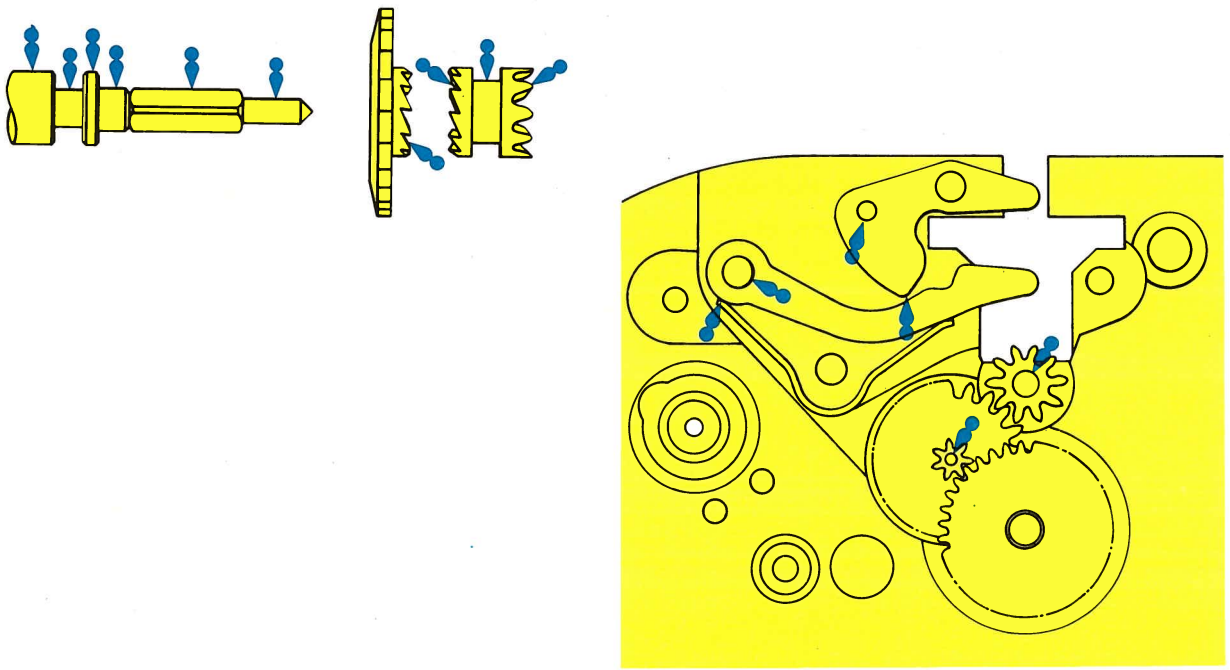


Fig. 2 Winding stem, Hand Setting Mechanism

2. Points requiring special attention in lubricating

This is a high-beating (10 beats) watch.

Lubricating points and oil are the same as those for 5-6 beating watches, but mainspring torques become considerably powerful compared with ladies' ordinary watches. Consequently, each pivot portion is improved to be stronger for this reason. Since lateral pressure is slightly increased, use the following procedures to correctly lubricate the upper and lower pivots of the center wheel and pinion and the third wheel and pinion.

2. 1 Lubrication of center wheel and pinion, third wheel and pinion (Seiko watch oil S-4)

○ Center wheel and pinion : To upper and lower pivots before assembling. Fig. 3

○ Third wheel and pinion : Upper pivot—inside the DIAFIX before assembling. Fig. 5
Lower pivot—inside the hole jewel before assembling. Fig. 4

2. 2 Crown wheel ring

Set the crown wheel ring after lubricating the two portions inside the crown wheel. Fig. 6

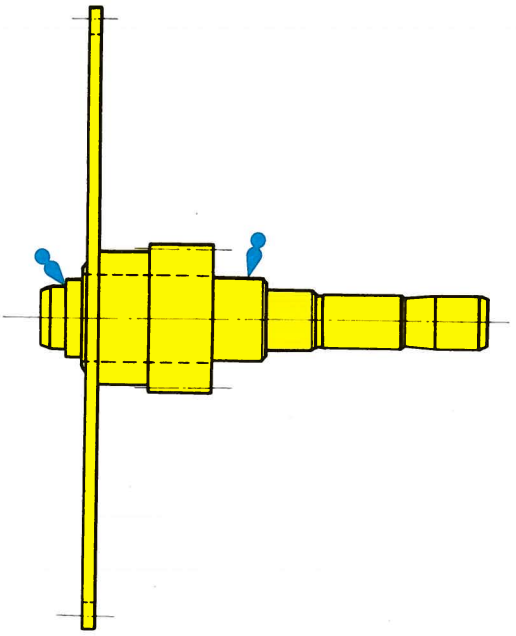


Fig. 3

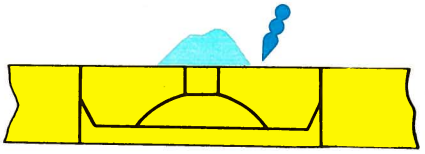


Fig. 4

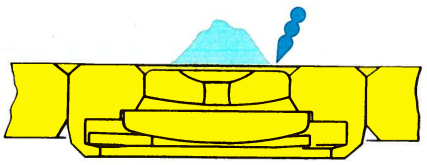


Fig. 5

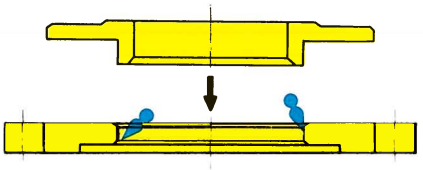


Fig. 6

Oiling 2118A

1. Lubricating points and types of oil

Refer to { Front train wheel ..... Fig. 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

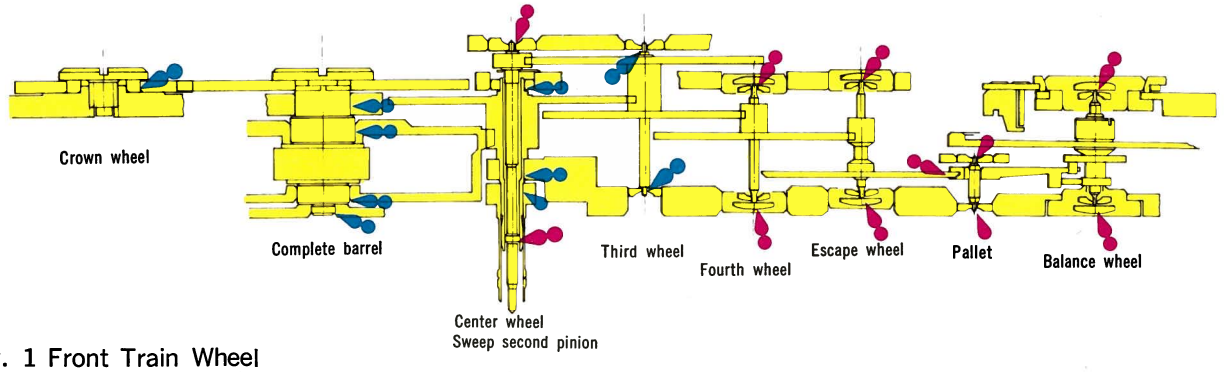


Fig. 1 Front Train Wheel

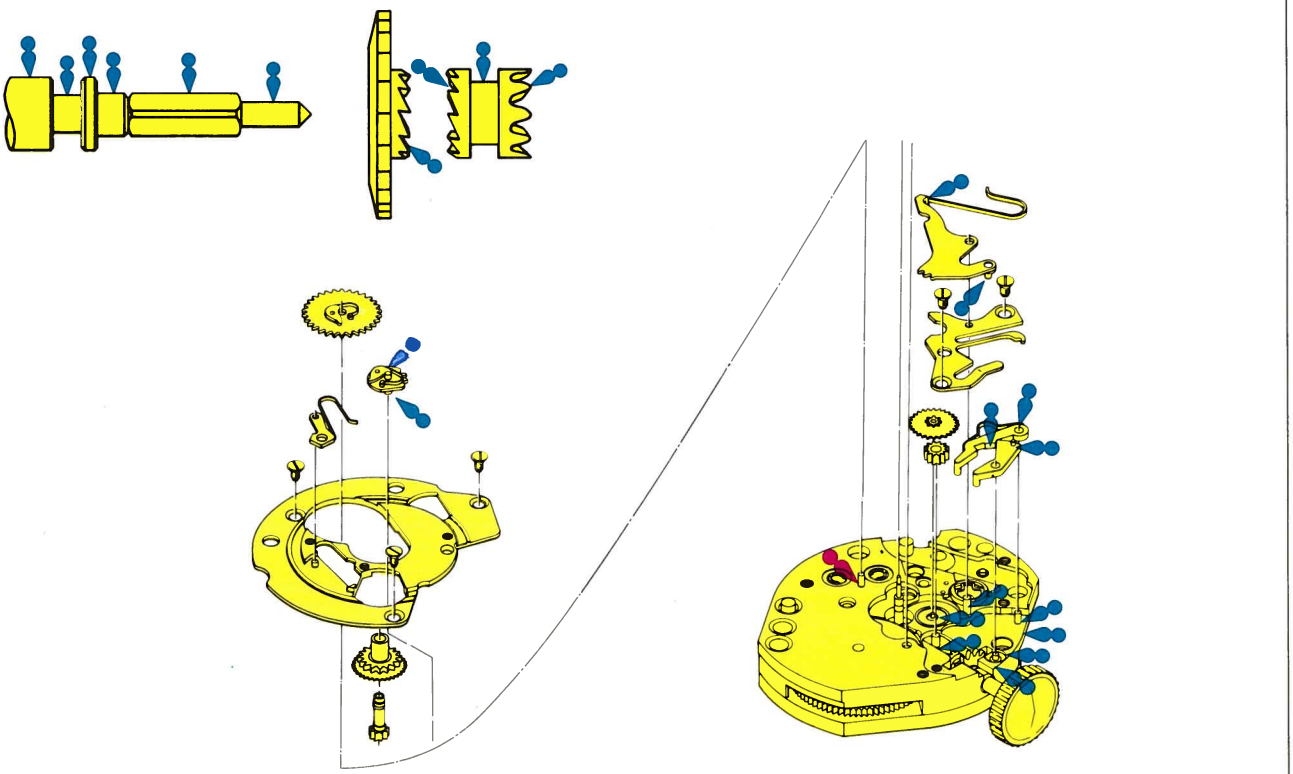


Fig. 2 Calendar, Hand Setting Mechanism

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

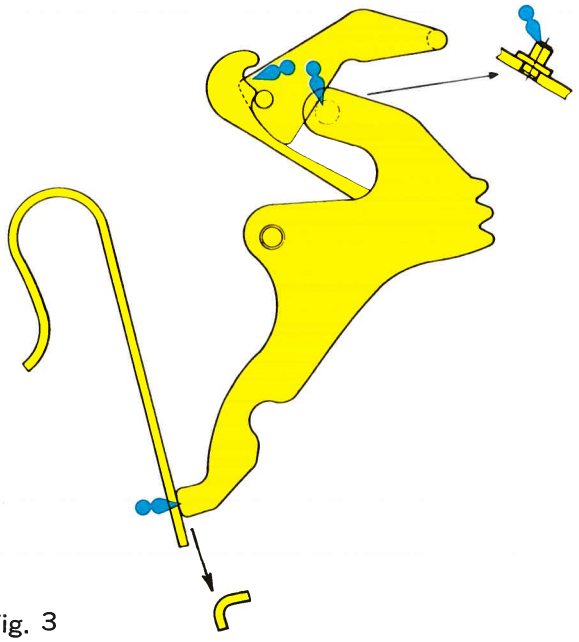


Fig. 3

○ 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

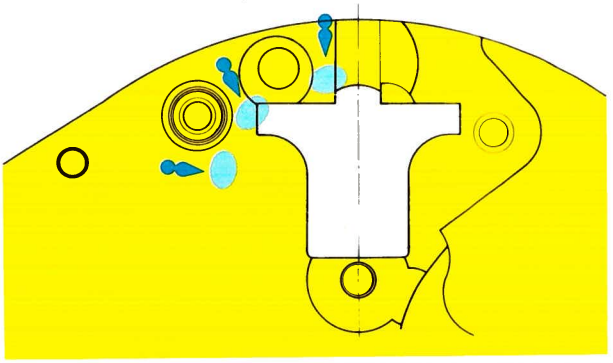


Fig. 4

○ Crown gasket (in case of waterproof watch)
Lubricate silicon grease to the crown gasket of the waterproof case with an oiling stick.
Fig. 5

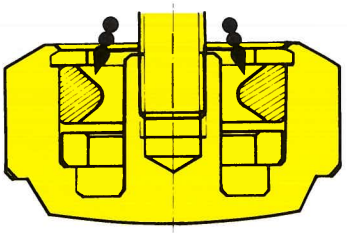


Fig. 5

Oiling 2517B

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar
- Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 3

■*Oil to be used for this caliber*

: Moebius Synt-A-Lube
: Seiko watch oil S-4
: " S-3
: " S-2

■*Oil quantity*

: Extremely small quantity
: Normal quantity
: Sufficient quantity
: Oil must not be applied

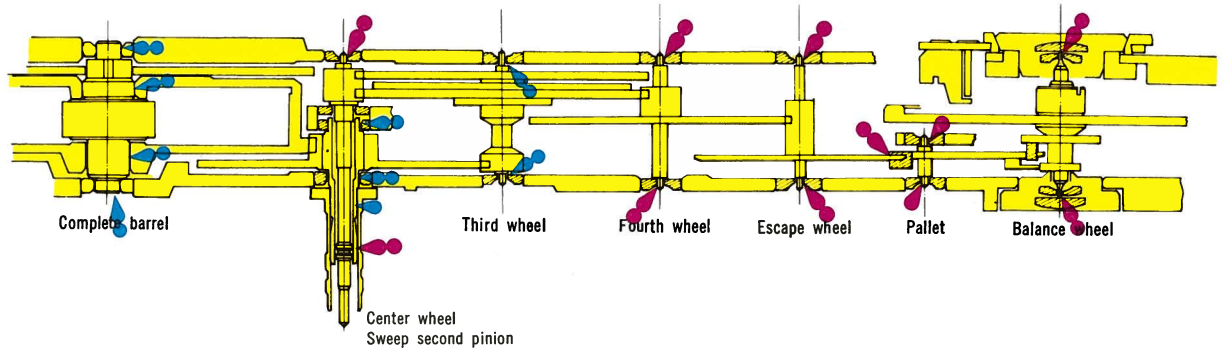


Fig. 1 Front Train Wheel

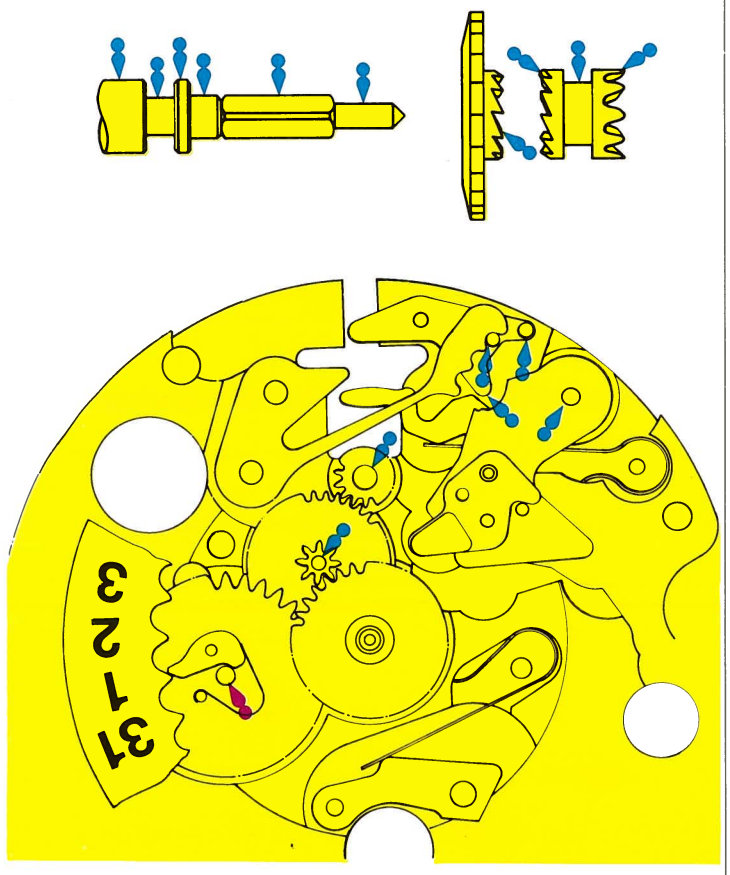


Fig. 2 Calendar, Hand Setting Mechanism

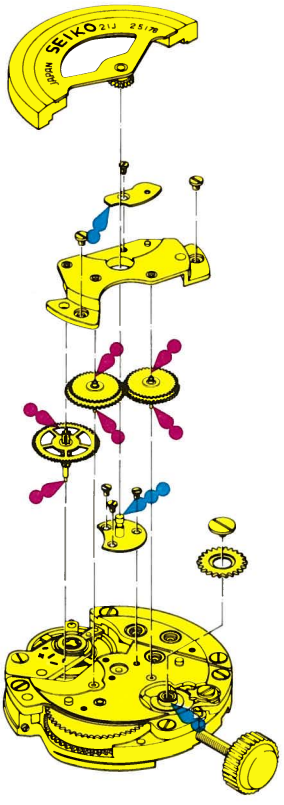


Fig. 3 Automatic Winding Mechanism

2. Points requiring special attention in lubricating

2. 1 Locking pawl of locking wheel

In this caliber, lubricating the pawl of locking wheel is an important step.

Automatic winding caliber of 25 series has three types of locking wheels as shown in Table 1.

Type III is a nonlubricating system; however, types I and II require an extremely small amount of lubricant. Lubricate them by referring to Table 1.

Lubrication of the 25 series (automatic winding mechanism) is the most important. If lubrication is improper, winding will become defective. Pay strict attention to this point.

2. 2 Upper pivot of locking wheel

Use a small quantity of oil to lubricate the upper pivot of locking wheel. If too much oil is used, oil will flow down to the wheel main body, covering even a side of the locking pawl and resulting in defective winding.

The correct quantity is shown on the upper pivot in Fig. 4.

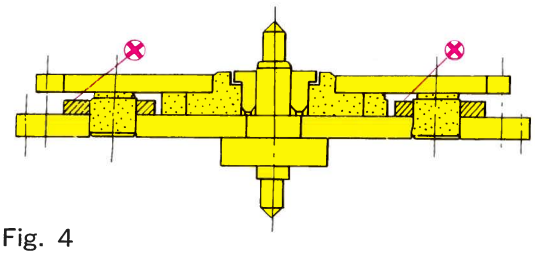


Fig. 4

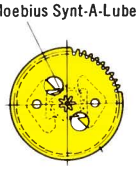
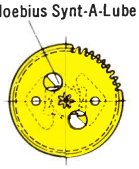
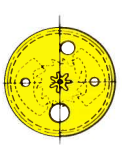
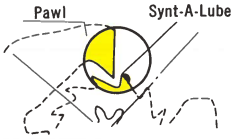
2. 3 Slipping attachment

Do not pull the mainspring out of the barrel. If it is necessary to pull out the mainspring, carefully lubricate the barrel according to Table 2.

2. 4 S-4 oil lubricating method

When applying S-4 oil to the pivot of third wheel and pinion, lubricate inside the hole jewel before assembling wheel.

Table 1

Item \ Type	I	II	III
Rear-view shape	Moebius Synt-A-Lube  ○Tip of pawl is visible through viewing hole. ○Pivot diameter is smaller than type II locking wheel.	Moebius Synt-A-Lube  ○Tip of pawl is visible through viewing hole. ○Pivot diameter is larger than type I locking wheel.	 ○Locking pawl is not visible through viewing hole.
Lubrication method	Lubricate ratchet of locking wheel by inserting an oiling stick through pawl viewing hole (Moebius Synt-A-Lube, small quantity)  Pawl Synt-A-Lube		Lubrication unnecessary
Parts number of locking wheel correspond	First locking wheel 667031 / Second locking wheel 668031	First locking wheel 667032 / Second locking wheel 668032	First locking wheel 667250 / Second locking wheel 668250

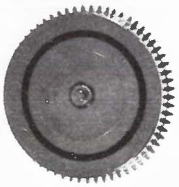
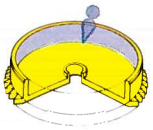


Table 2

Barrel	With black ring mark	Without mark
Oil type	S-3	S-2
Lubrication method	 Apply oil with a soft brush to the extent that the inside wall surface of the barrel is visible.	 Apply oil with a soft brush to the inside wall surface and the barrel bottom to the extent that the barrel surface is visible. After inserting the mainspring, apply oil to the upper surface of the coiled mainspring.

Oiling 4006A

1. Lubricating points and types of oil

Refer to
- Front train wheel.....Fig. 1
- Setting mechanism .....Fig. 2
- Automatic winding mechanism .....Fig. 3
- Calendar and bell mechanism .....Fig. 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
: Oil must not be applied

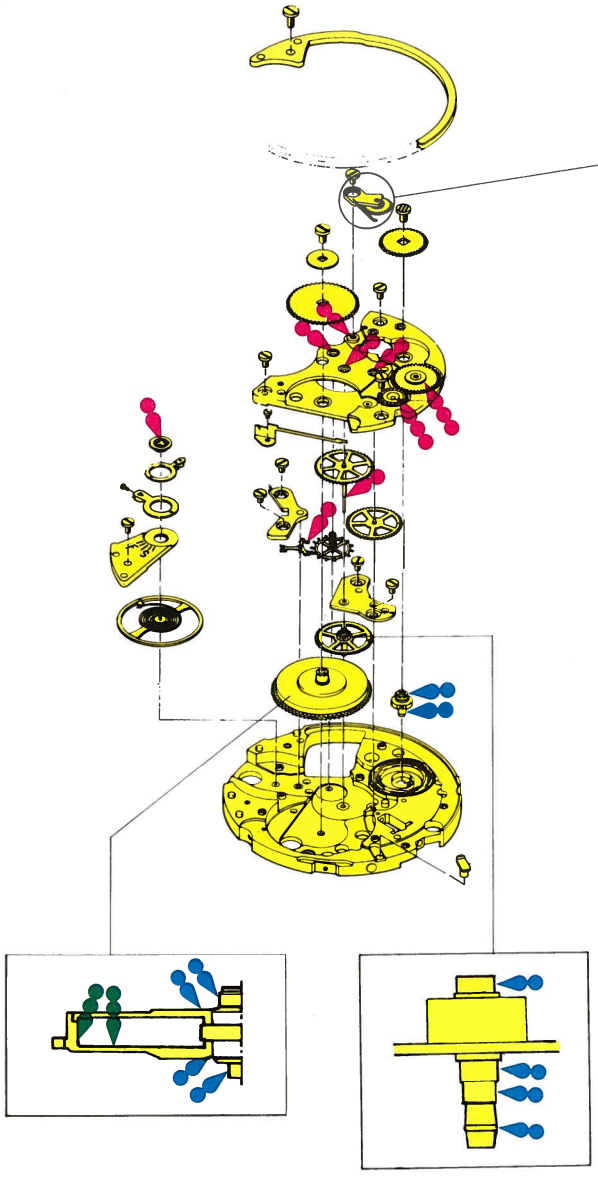


Fig. 1 Front Train Wheel

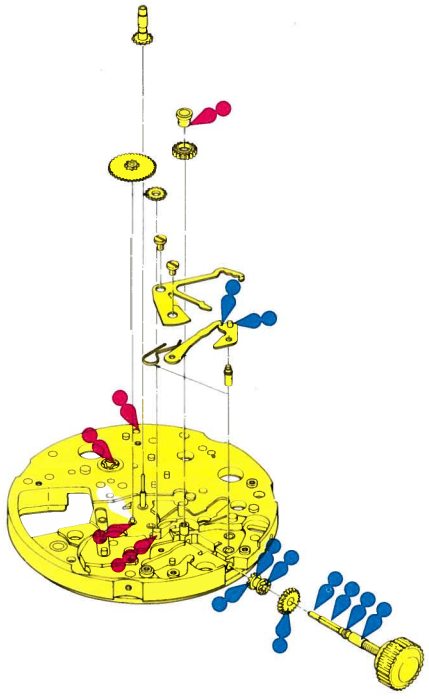


Fig. 2 Setting Mechanism

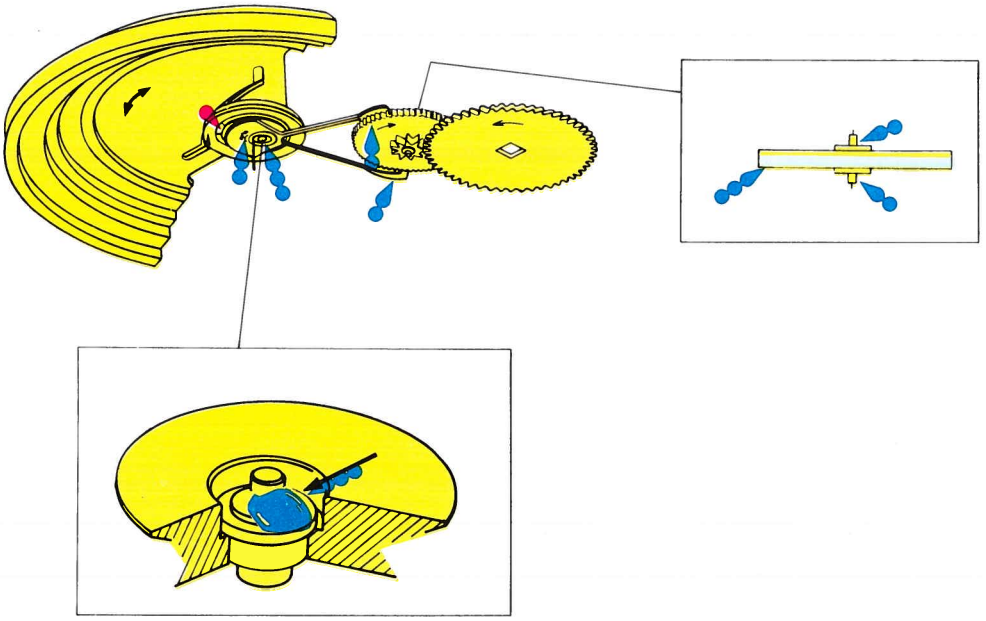


Fig. 3 Automatic Winding Mechanism

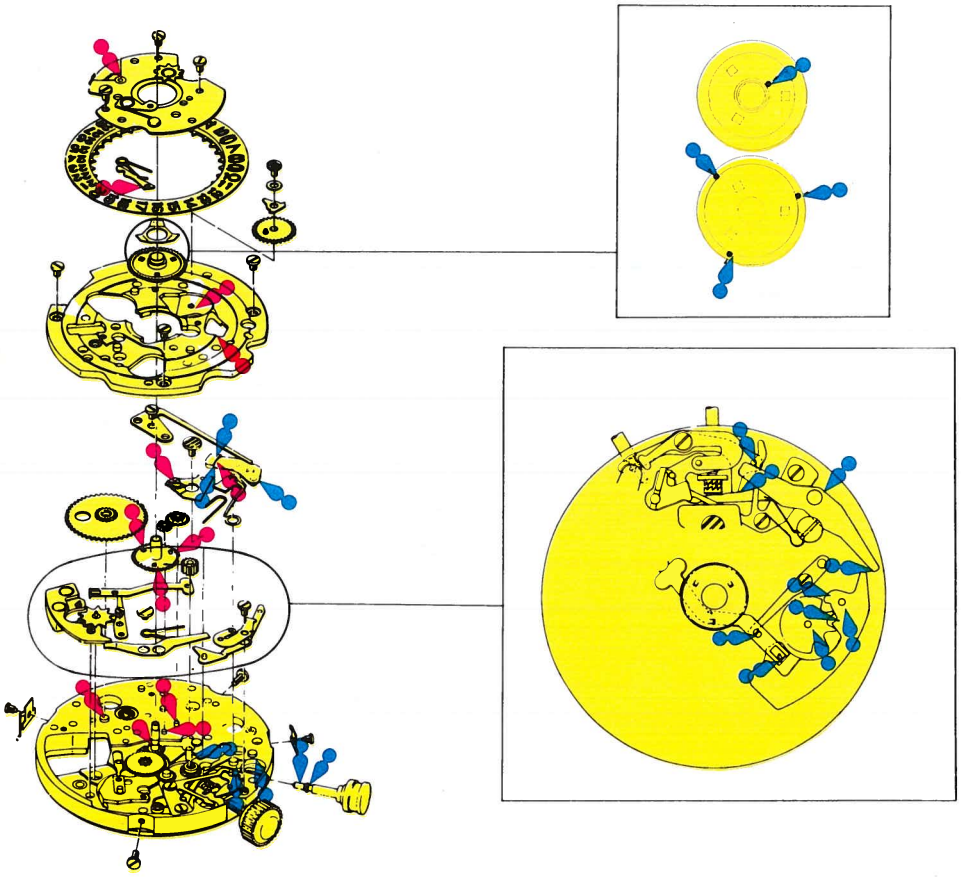


Fig. 4 Calendar and Bell Mechanism

Oiling 4522A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar
- 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
: Sufficient quantity
: Oil must not be applied

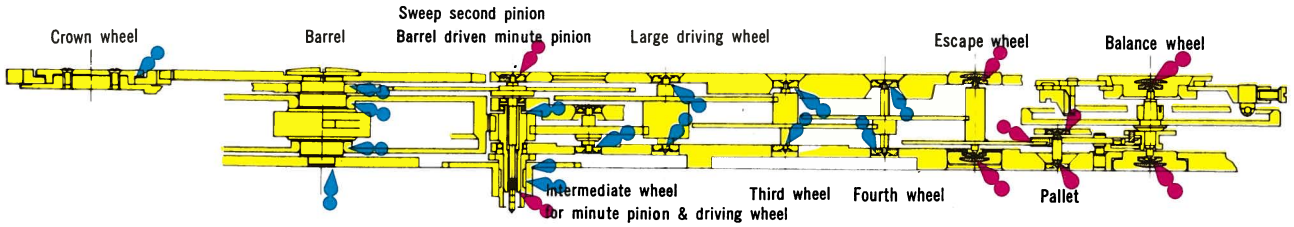


Fig. 1 Front Train Wheel

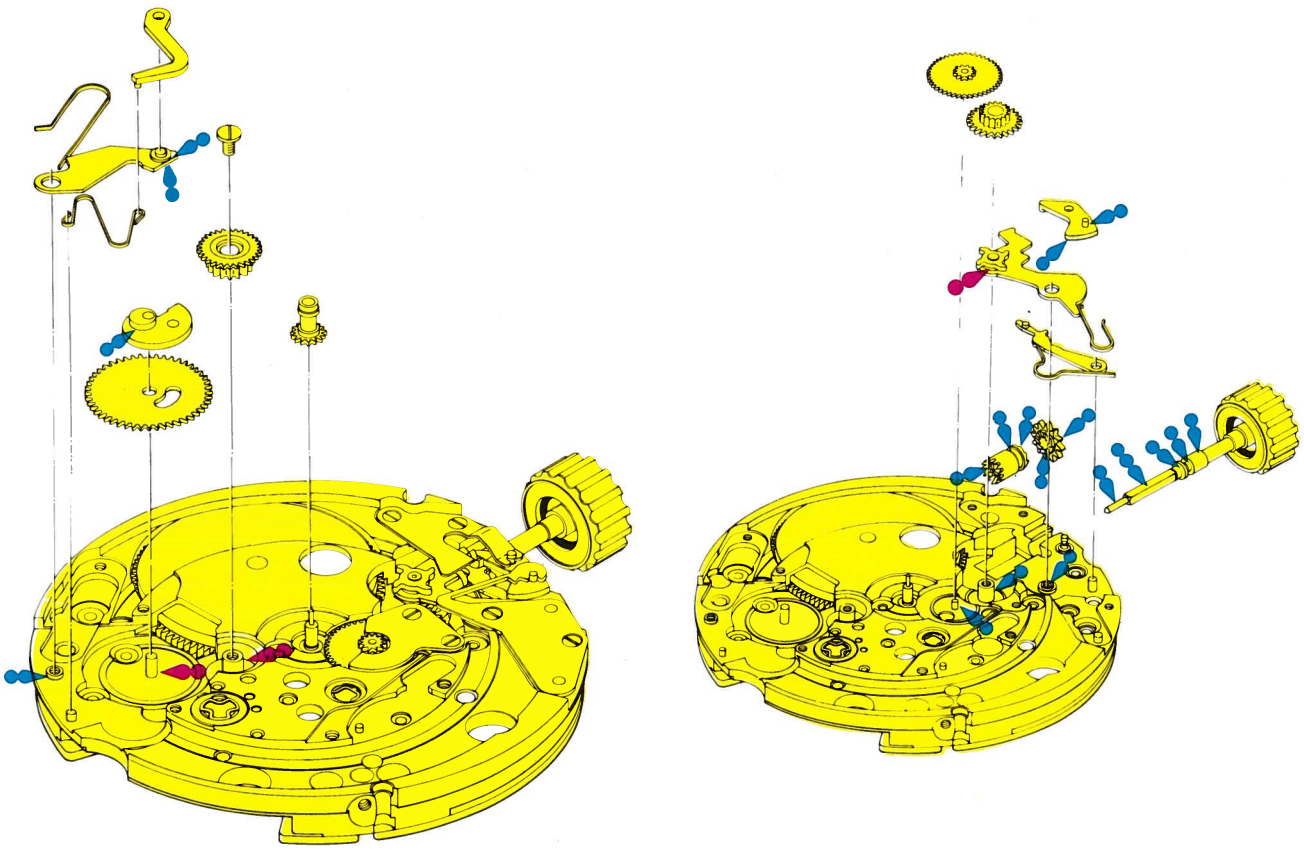


Fig. 2 Calendar, Hand Setting Mechanism

2. Points requiring special attention in lubricating

45 series caliber represents a high-beating (10 beats) watch.

Due to powerful mainspring torque, lateral pressure applied to each train wheel is considerably increased even though these mechanisms are improved. Lubricating portions and types of oil are almost identical to other watches, however, pay special attention to the following points.

2. 1 Lubricating each train wheel pivot with Seiko watch oil S-4

○ Barrel-driven minute pinion with cannon pinion: Apply to upper and lower pivots before assembling. Fig. 3

○ Intermediate wheel for minute pinion & driving wheel
Center wheel and pinion
Third wheel and pinion
Fourth wheel and pinion
Apply to flat side of hole jewel before assembling. Fig. 4

2. 2 Lubricating the calendar mechanism

In case that lubrication applied to the calender mechanism is incorrect, it will cause malfunction of instant date changing, insufficient date changing, or two dates skipping, so pay attention to this point. Fig. 5

○ Date cam jumper
(A) Side face : Always apply Seiko watch oil S-4 to the side. Never lubricate its lower surface.
(B) Date finger pin: Apply a small quantity of Seiko watch oil S-4 to its side. Fig. 6

○ Date cam eccentric portion: Apply a small quantity of S-4 to the side. Fig. 7

○ Date driving wheel pin : Apply S-4 to the side evenly. Fig. 8

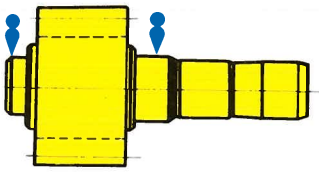


Fig. 3

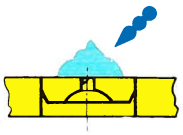


Fig. 4

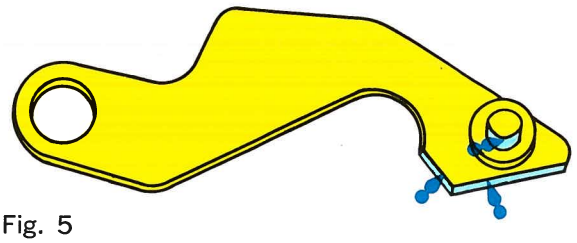


Fig. 5

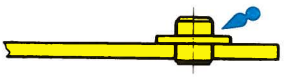


Fig. 6

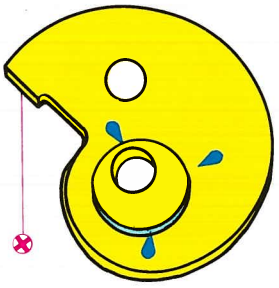


Fig. 7

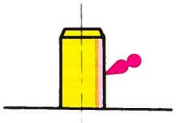


Fig. 8

Oiling 5106A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar mechanism ..... Fig. 2
- Hand setting mechanism ..... Fig. 3
- Automatic winding mechanism ..... Fig. 4

■*Oil to be used for this caliber*

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

■*Oil quantity*

: Extremely small quantity
: Normal quantity
: Sufficient quantity
: Oil must not be applied

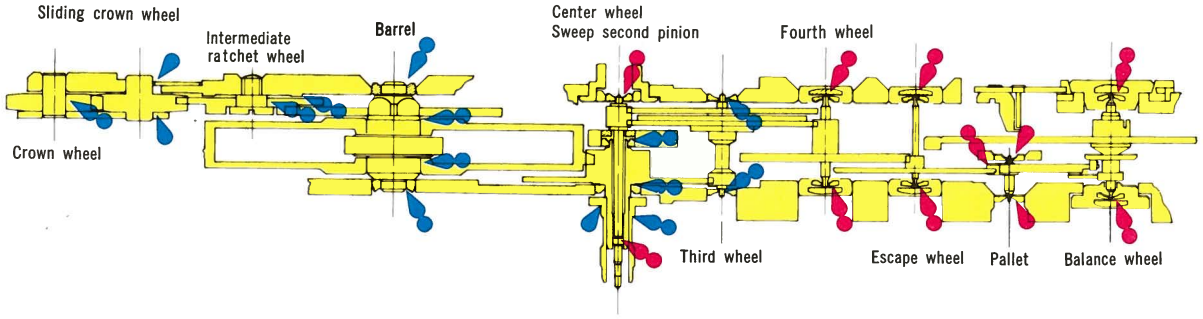


Fig. 1 Front Train Wheel

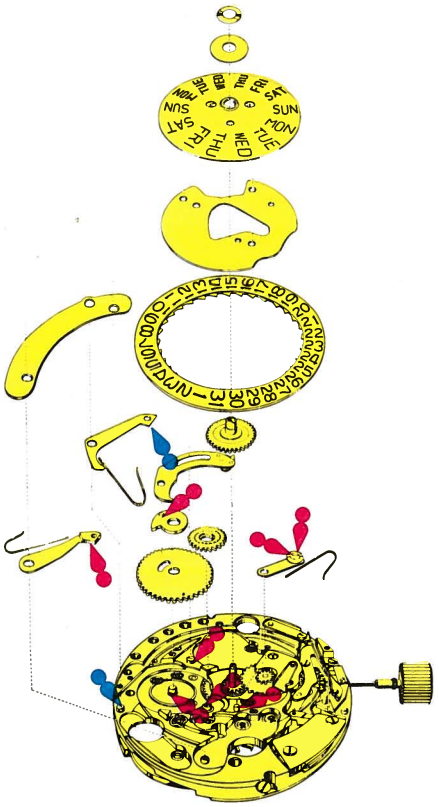


Fig. 2 Calendar Mechanism

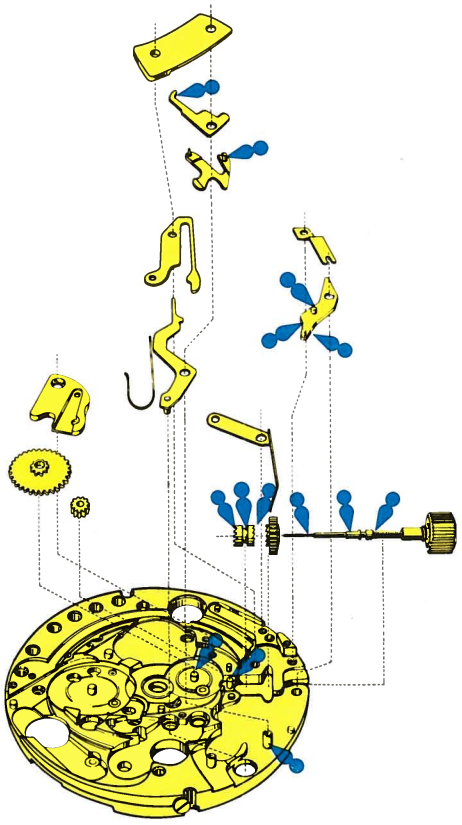


Fig. 3 Hand Setting Mechanism

2· Points requiring special attention in lubricating

2. 1 Calendar mechanism

Efficient, smooth functioning of the instant date changing mechanism depends on its lubricated condition. Pay attention to the following points.

○ Lubricating the date cam jumper side face
If oil on the date cam side (when lubricating the date cam jumper side face) flows between the date cam and lever slide, they will adhere to each other and action of the lever slide becomes heavy, causing defective day and date changing. Correctly apply Seiko watch oil S-4 to the date cam jumper side face. Fig. 5.6

○ Lubricating the date jumper side face
Always correctly apply oil to the side face in the same way as the date cam jumper. Fig. 7

2. 2 Automatic winding mechanism

○ Lubricating the differential wheel (only cal. 5106).
Correctly lubricate the tooth of the locking wheel through a space between the upper or lower wheel and the spacer. (Use an oiling stick with a sharp tip). Fig. 8

○ Lubricating the slipping attachment
Since this is the black ring marked barrel, lubricate with Seiko watch oil S-3. (Wall surface only)

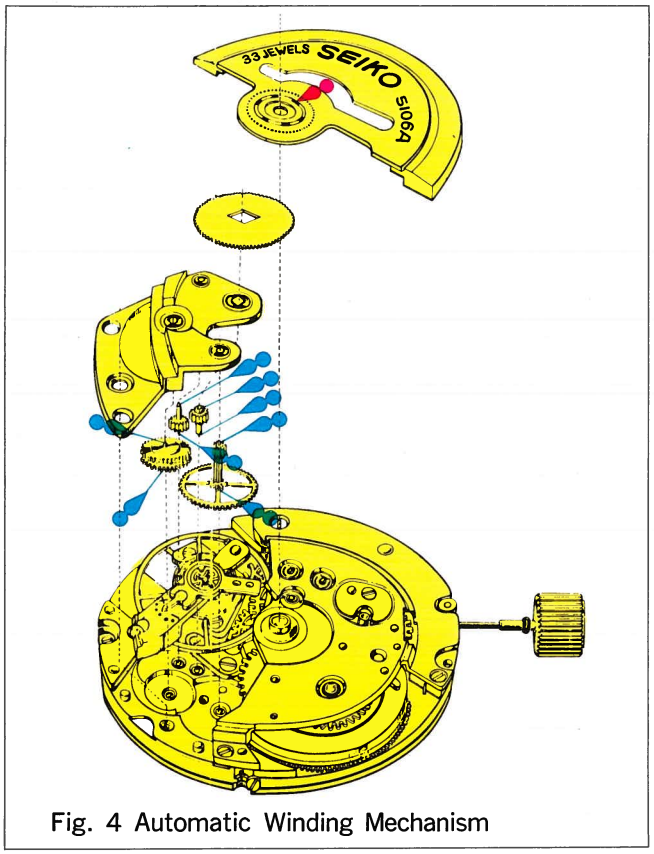


Fig. 4 Automatic Winding Mechanism

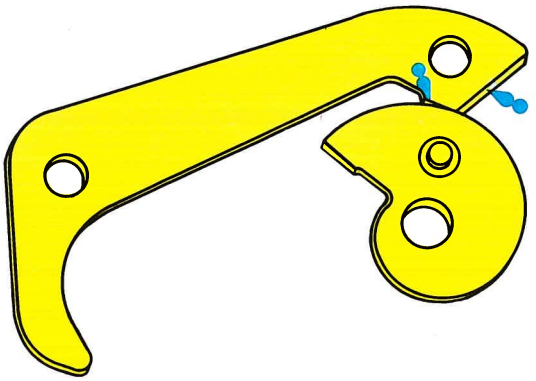


Fig. 5

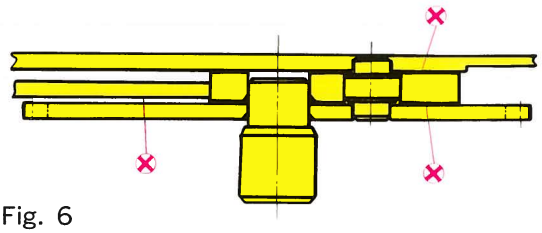


Fig. 6

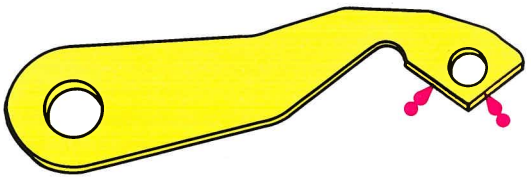


Fig. 7

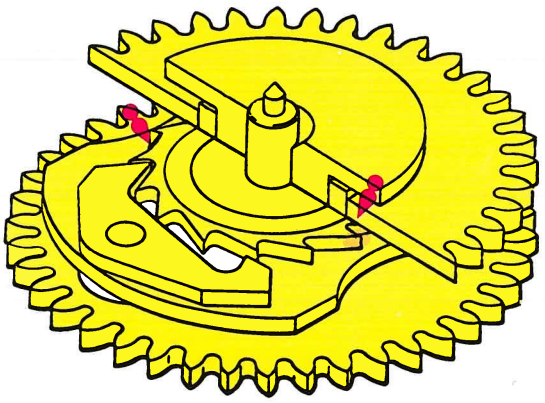


Fig. 8

Oiling 5606A

1. Lubricating points and types of oil

Refer to
- Front train wheel.....Fig. 1
- Calendar
- Hand setting mechanism.....Fig. 2
- Automatic winding mechanism .....Fig. 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
: Oil must not be applied

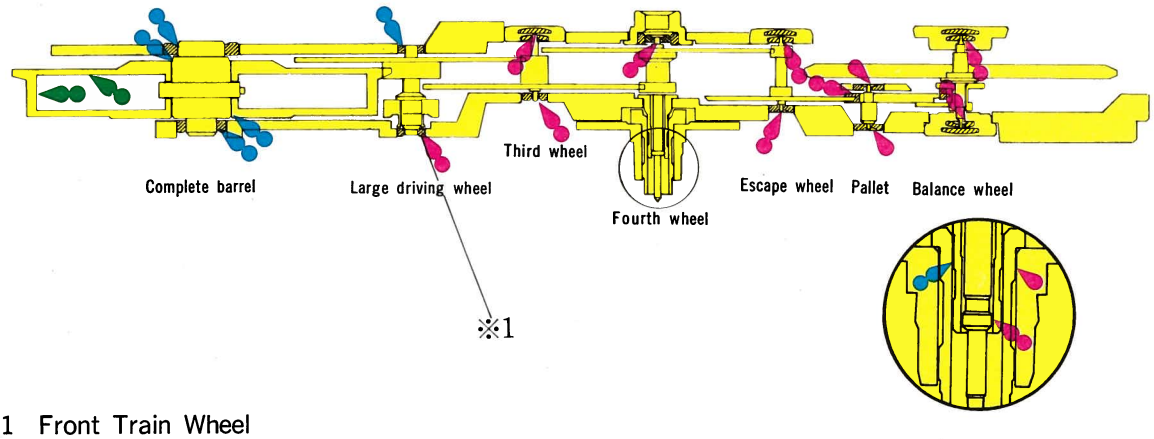


Fig. 1 Front Train Wheel

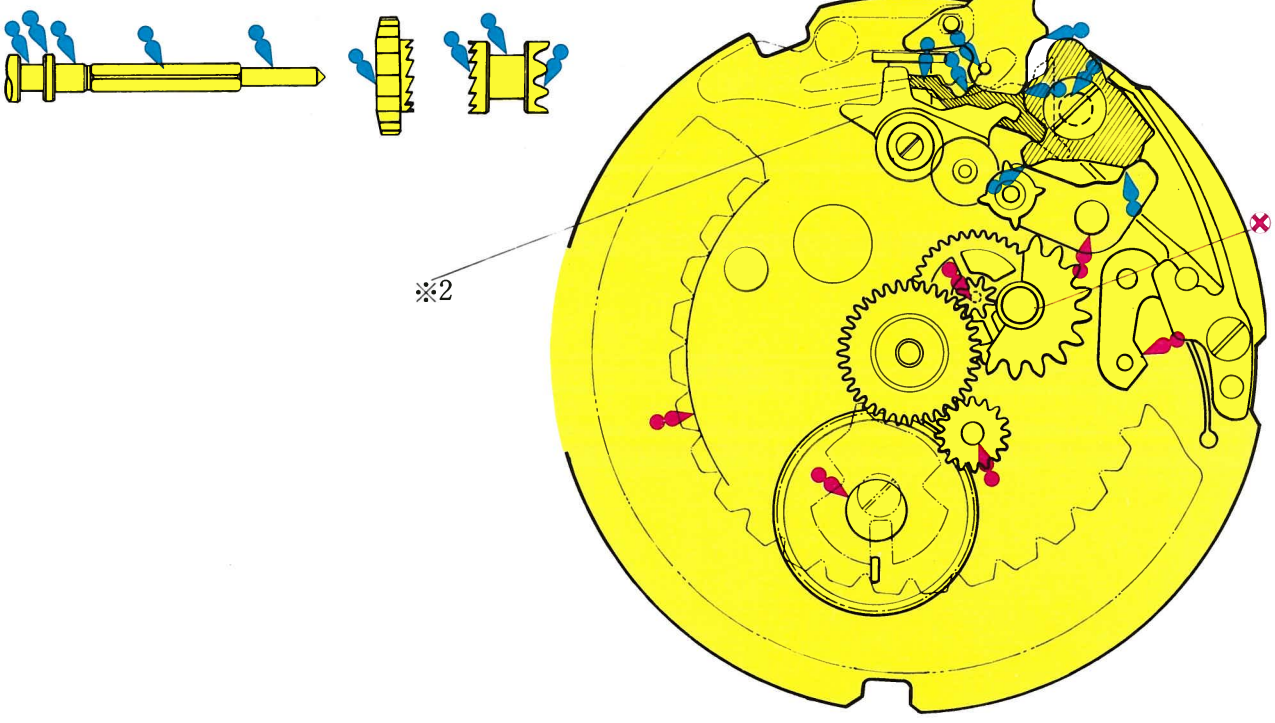


Fig. 2 Calendar, Hand Setting Mechanism

Points requiring special attention in lubricating

Refer to following diagram lubricating marked ※1.
Refer to following diagram lubricating marked ※2.
Refer to following diagram lubricating marked ※3.

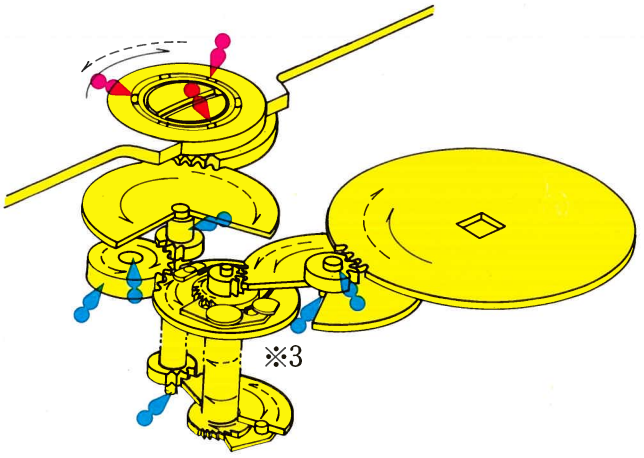
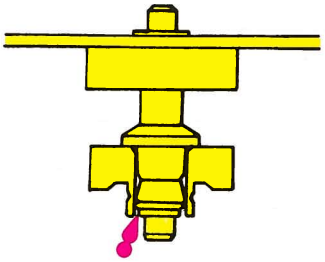
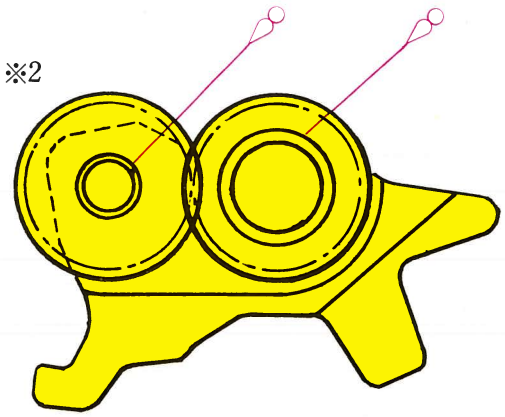


Fig. 3 Automatic Winding Mechanism

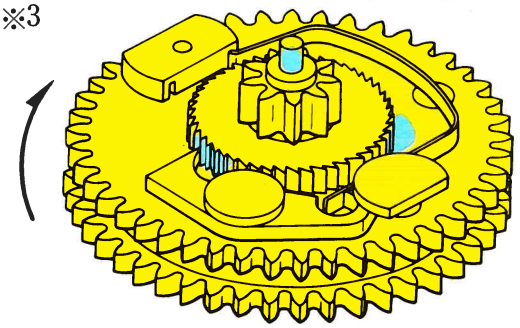
※1



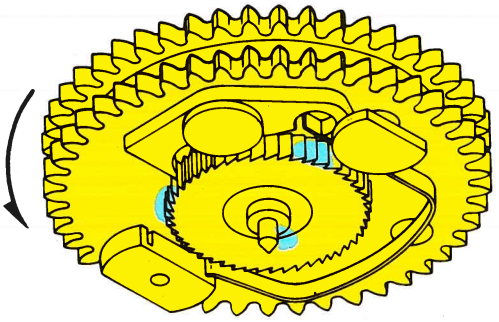
※2



※3



Looking at differential wheel from above



Looking at differential wheel from below

Oiling 6106A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 3

■ *Oil to be used for this caliber*

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

■ *Oil quantity*

: Extremely small quantity
: Normal quantity
: Sufficient quantity
: Lubricate on the back side
: Oil must not be applied

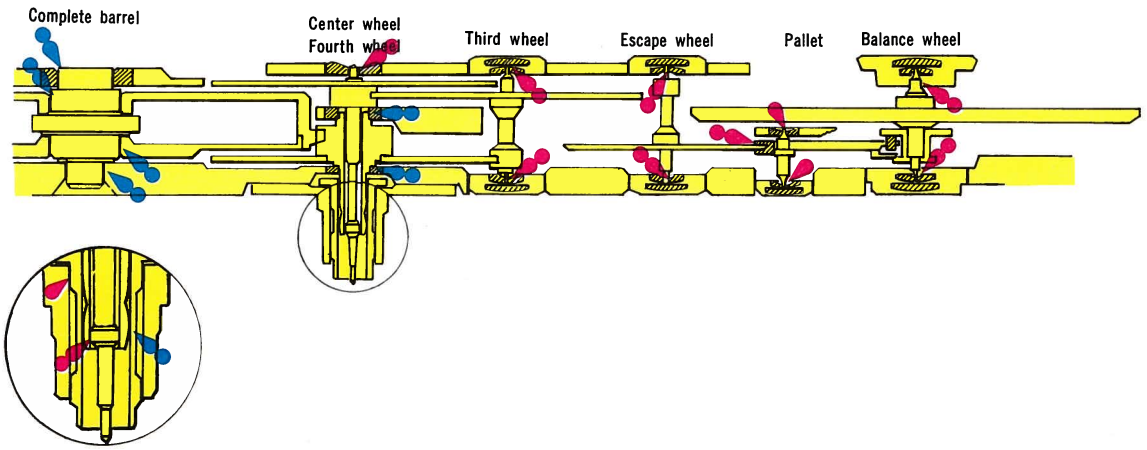


Fig. 1 Front Train Wheel

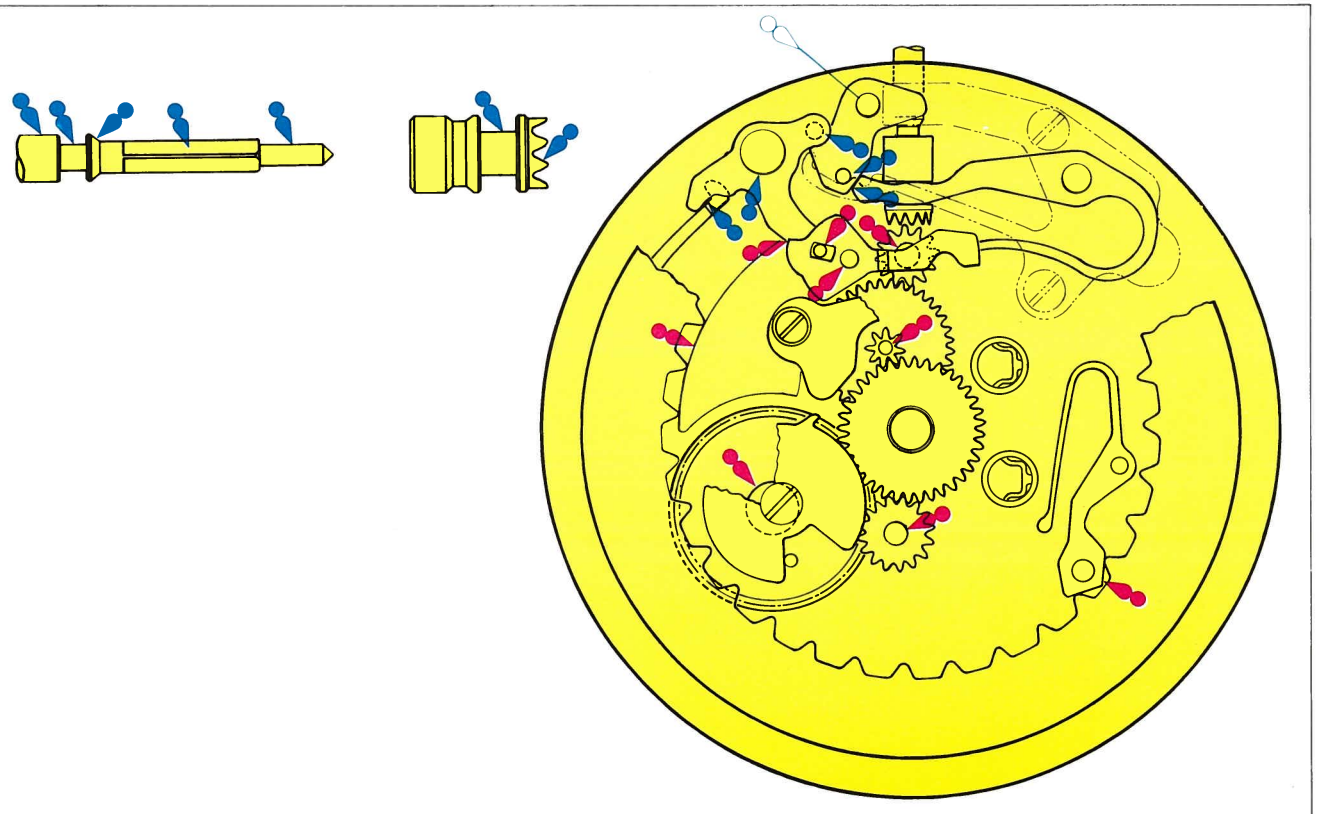


Fig. 2 Calendar, Hand Setting Mechanism

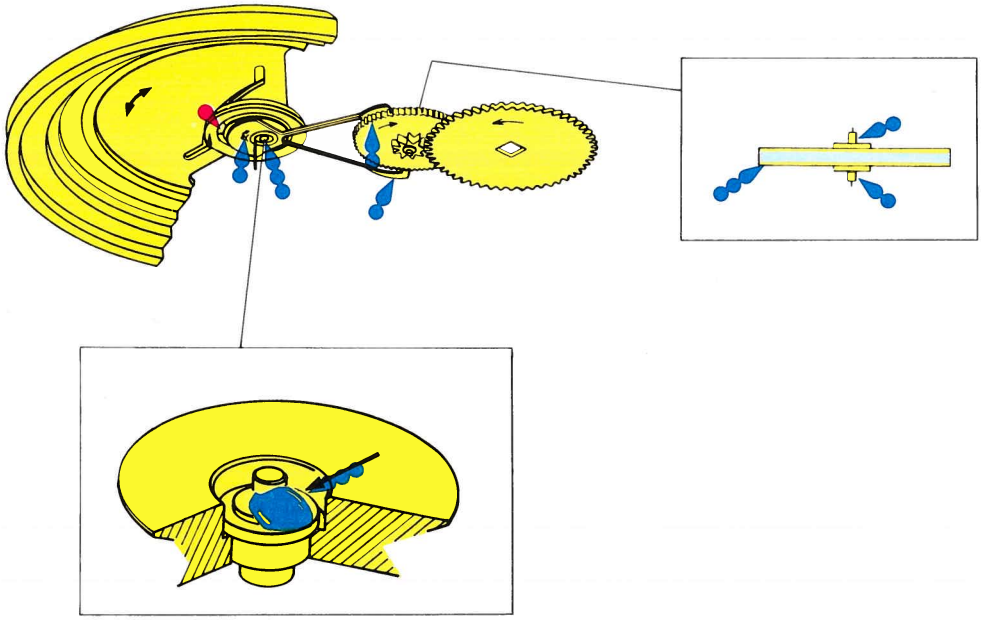


Fig. 3 Automatic Winding Mechanism

Oiling 6206A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 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
: Oil must not be applied

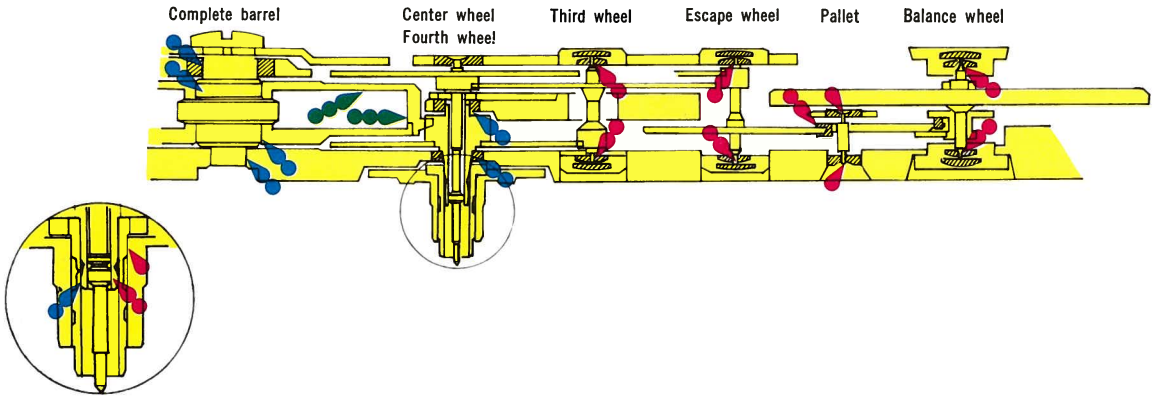


Fig. 1 Front Train Wheel

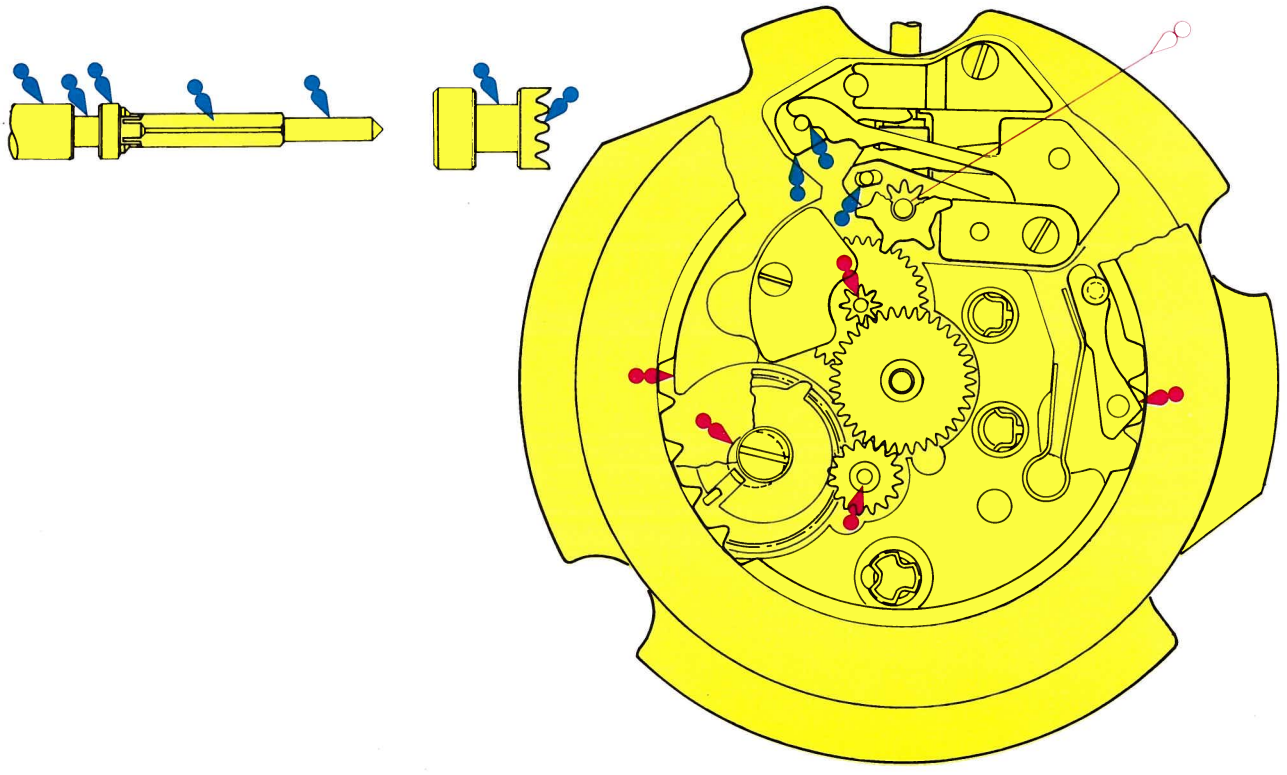


Fig. 2 Calendar, Hand Setting Mechanism

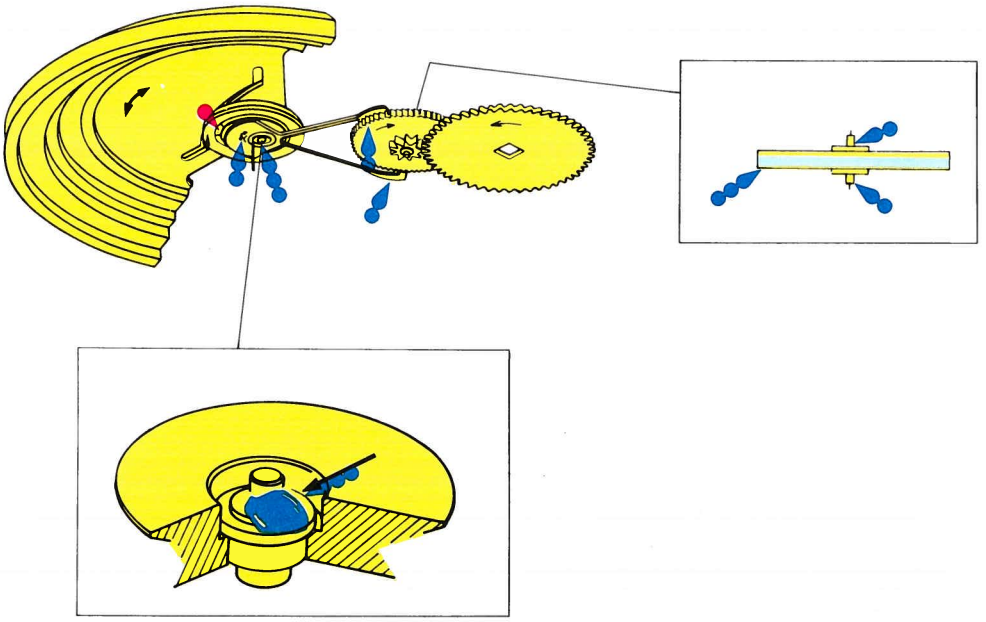


Fig. 3 Automatic Winding Mechanism

Oiling 6619A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 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
: Oil must not be applied

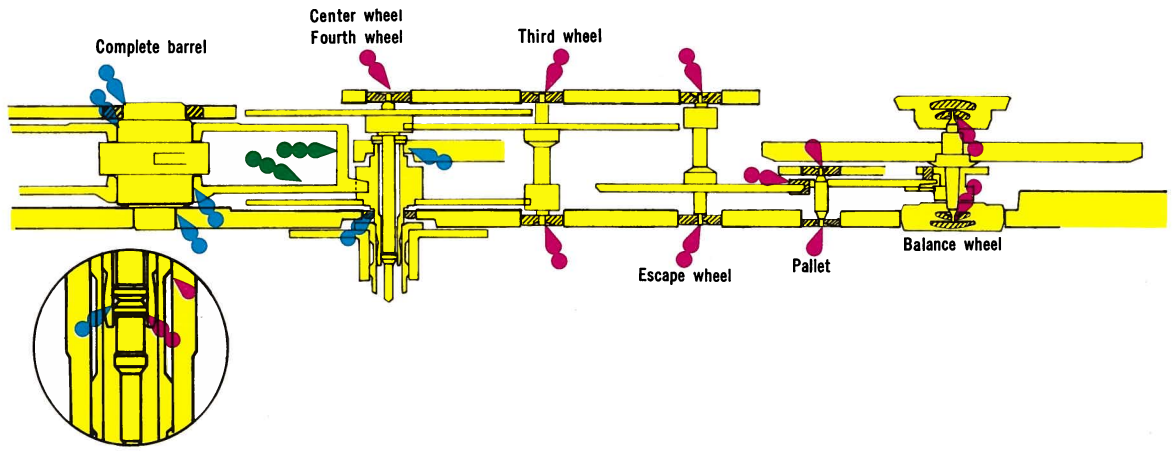


Fig. 1 Front Train Wheel

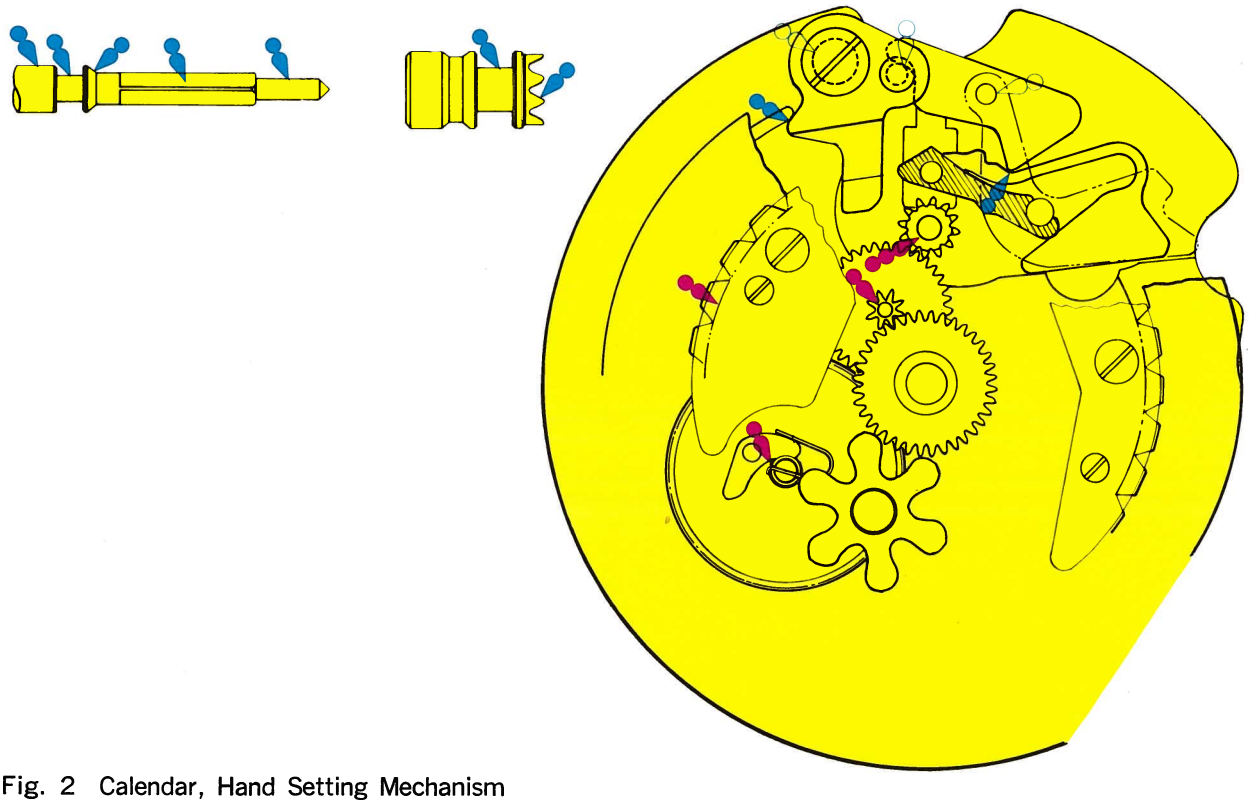


Fig. 2 Calendar, Hand Setting Mechanism

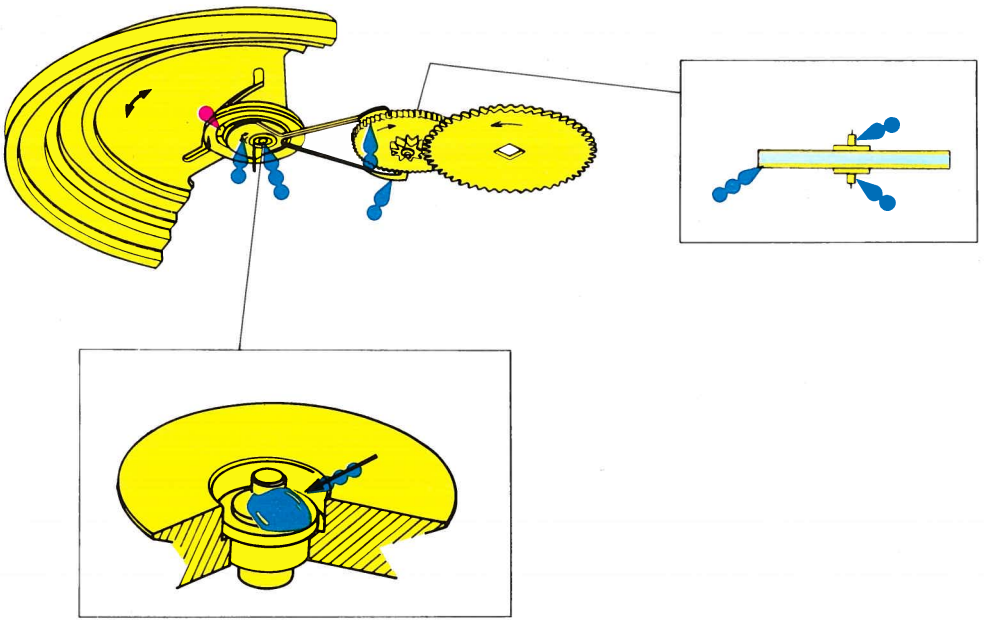


Fig. 3 Automatic Winding Mechanism

Oiling 7005A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 3

■*Oil to be used for this caliber*

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

■*Oil quantity*

: Extremely small quantity
: Normal quantity
: Sufficient quantity
: Oil must not be applied

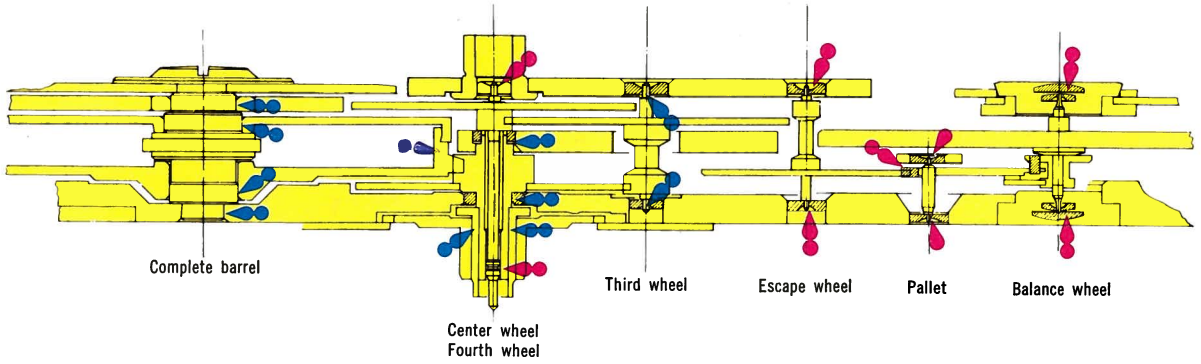


Fig. 1 Front Train Wheel

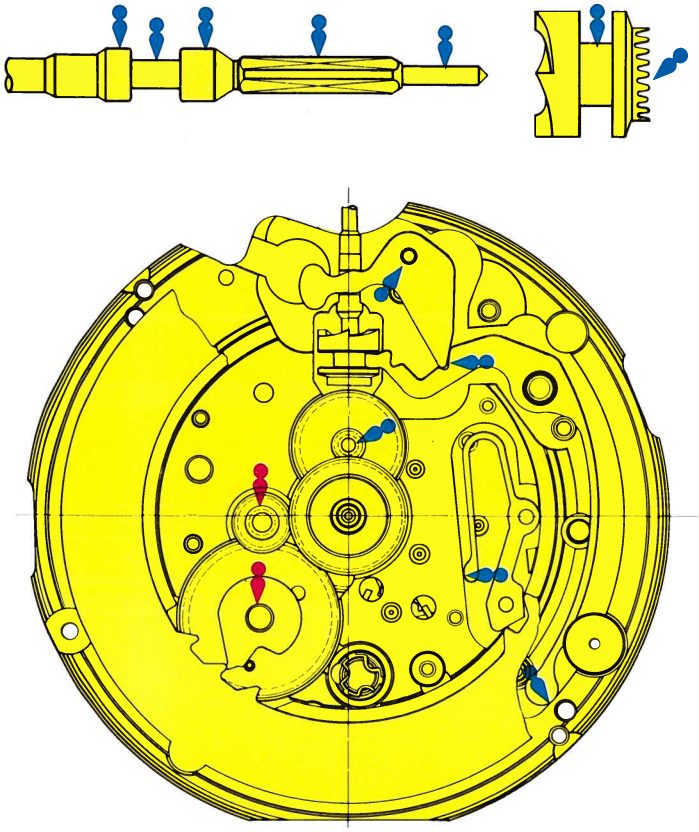


Fig. 2 Calendar, Hand Setting Mechanism

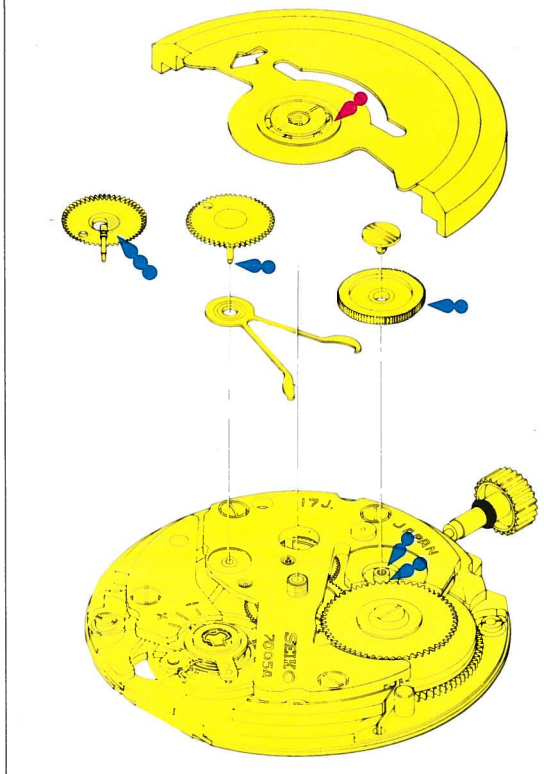


Fig. 3 Automatic Winding Mechanism

2. Points requiring special attention in lubricating

2 .1 Automatic winding mechanism

Seiko watch oil S-4 is applied to the automatic winding mechanism. Especially lubricating the eccentric portion of the first reduction wheel and the second reduction wheel is important, requiring sufficient oil. (Fig. 4.5)

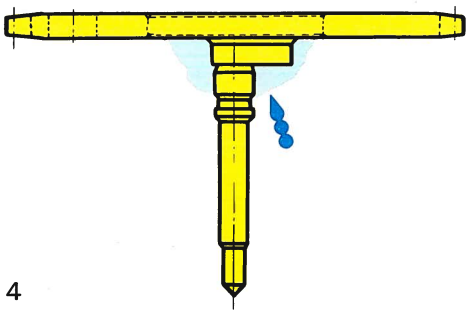


Fig. 4

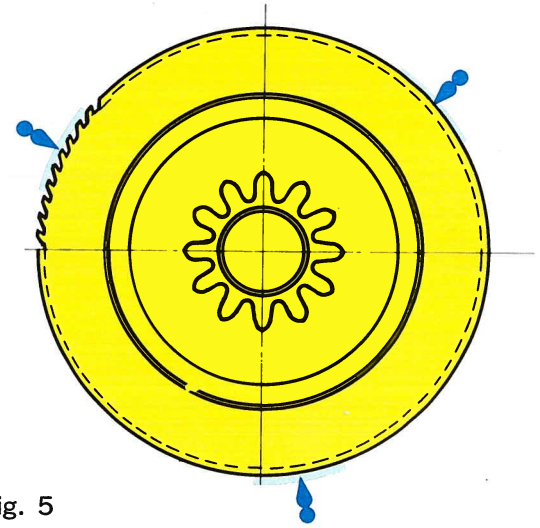
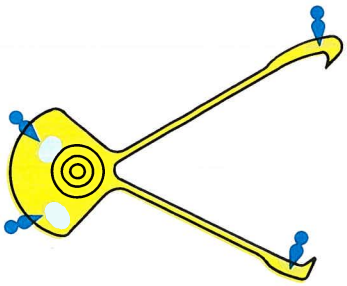
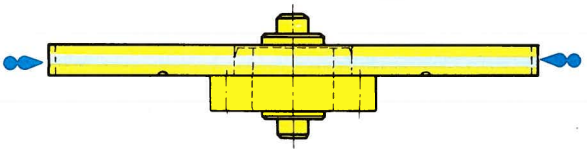


Fig. 5

○ Pawl lever



○ Teeth of transmission wheel



Oiling 7619A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig. 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 3

■*Oil to be used for this caliber*

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

■*Oil quantity*

: Extremely small quantity
: Normal quantity
: Sufficient quantity

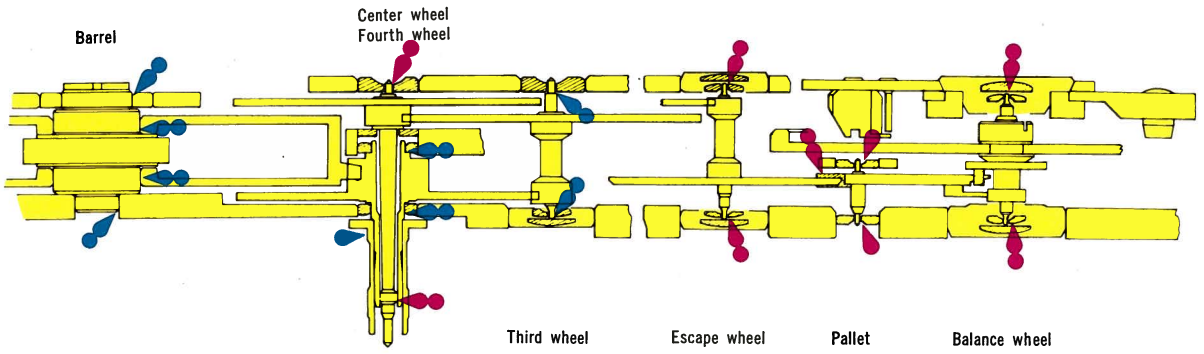


Fig. 1 Front Train Wheel

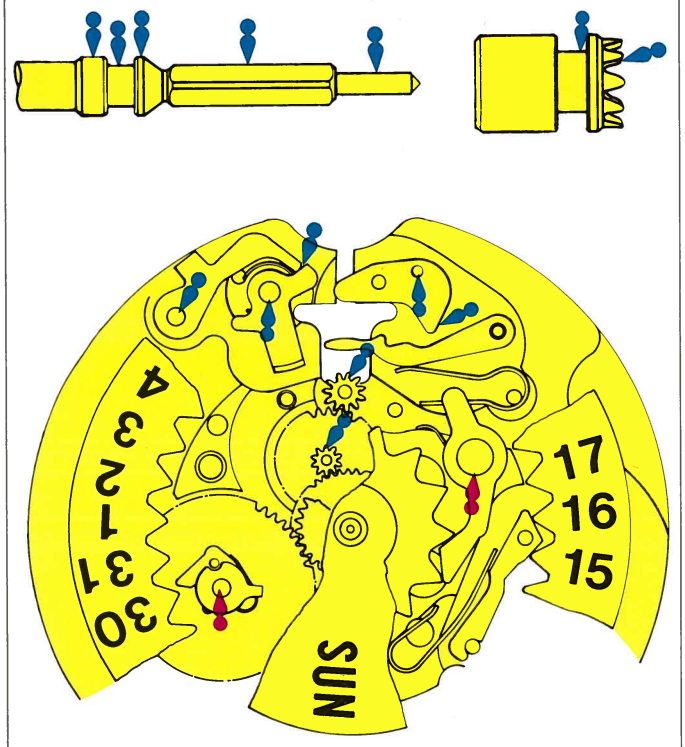


Fig. 2 Calendar, Hand Setting Mechanism

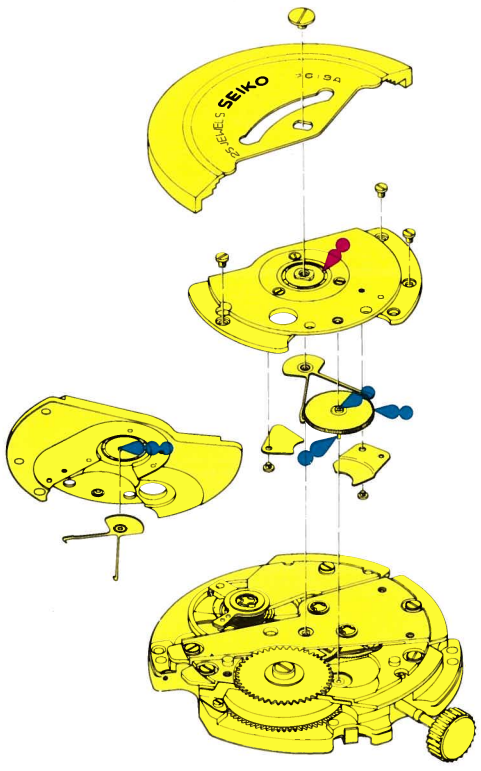


Fig. 3 Automatic Winding Mechanism

2. Points requiring special attention in lubricating

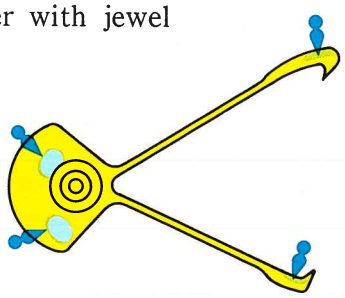
2. 1 Automatic winding mechanism

In this caliber, lubricating the automatic winding mechanism (eccentric pin, pawl lever and teeth of transmission wheel) is important. Winding capacity is enhanced by correctly lubricating these parts with Seiko watch oil S-4.

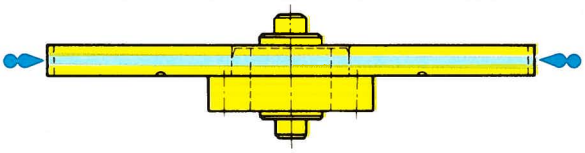
○ Eccentric pin

A lubricating effect can be obtained by applying the sufficient amount of oil shown in the diagram below.

○ Pawl lever with jewel



○ Teeth of transmission wheel



○ Lubricating the slipping attachment

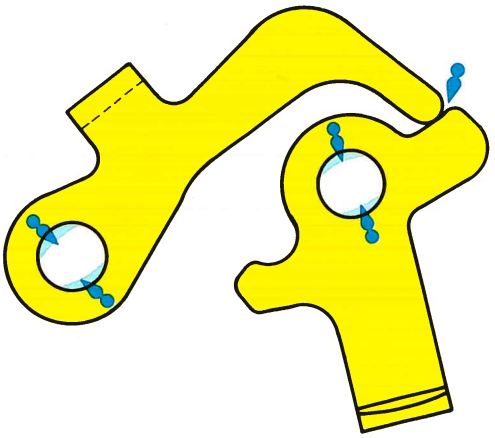
If the mainspring is removed from the barrel, carefully lubricate with Seiko watch oil S-2 (without bottle black ring mark) as shown in the diagram on the right.

■ Apply oil to the inner wall surface and bottom surface to an extent that the barrel inner surface is visible with a brush.

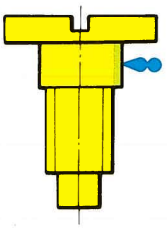
■ After inserting the mainspring, apply a thin coat of oil to the mainspring upper surface.

2. 2 Date correcting mechanism

To ensure date changing smoothly, lubricate this mechanism as shown in the diagram.



In these cases, the screws may be lubricated.



Oiling 8306A

1. Lubricating points and types of oil

Refer to
- Front train wheel ..... Fig 1
- Calendar, Hand setting mechanism ..... Fig. 2
- Automatic winding mechanism ..... Fig. 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
: Oil must not be applied

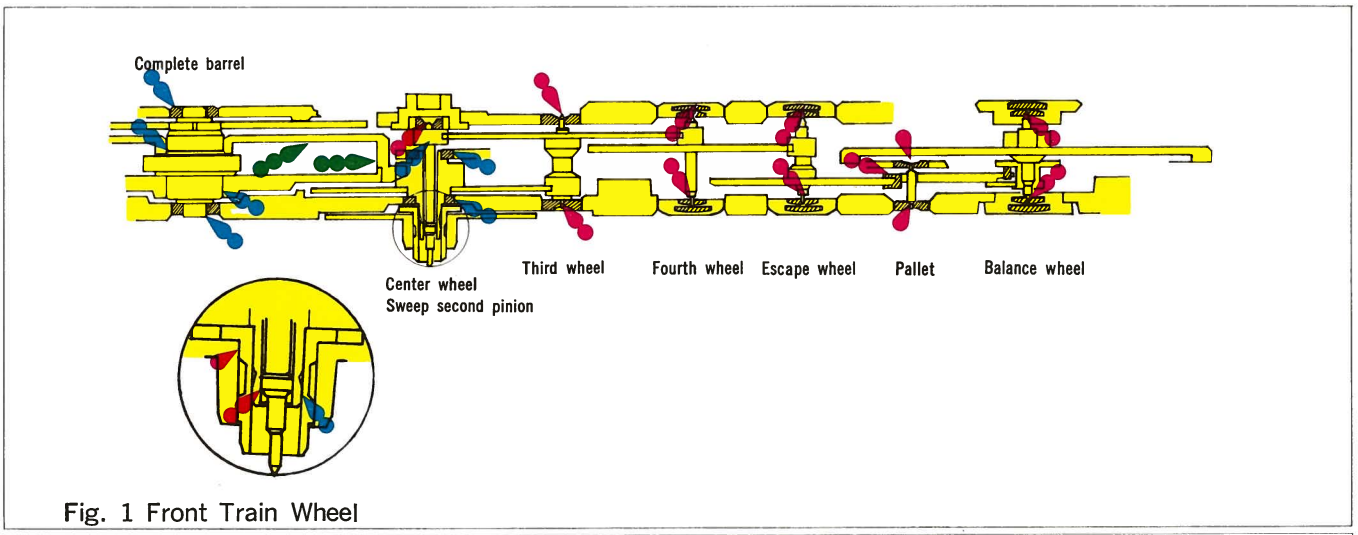


Fig. 1 Front Train Wheel

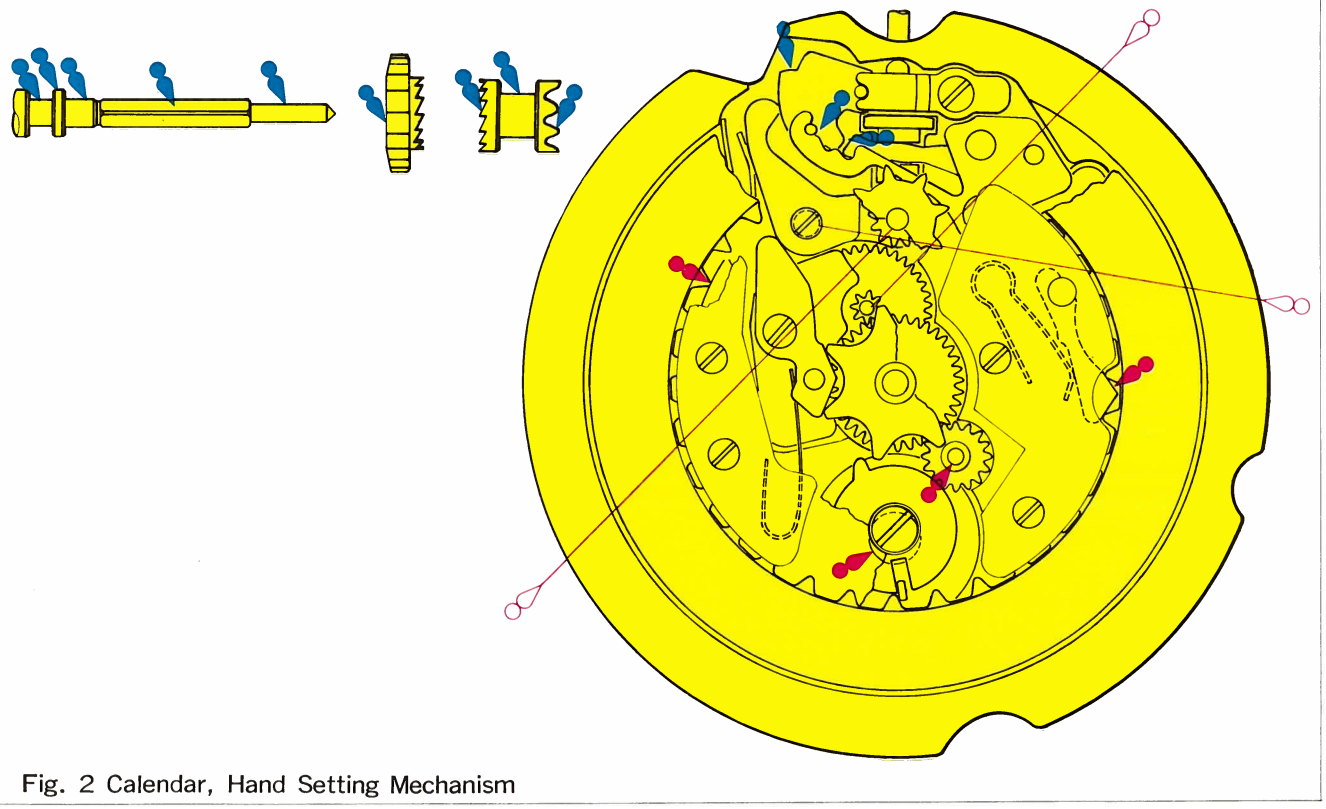


Fig. 2 Calendar, Hand Setting Mechanism

2. Points requiring special attention in lubricating

Lubricate upper and lower pivot holes of ①, ②, and ③

Lubricate teeth of ④

Always wash ⑤, ⑥, ⑦, and ⑧ when repairing the watch

⑤ : First reverser idler
⑥ : Roller locking wheel
⑦ : Second reverser idler
⑧ : First reduction wheel
⑨ : Second reduction wheel

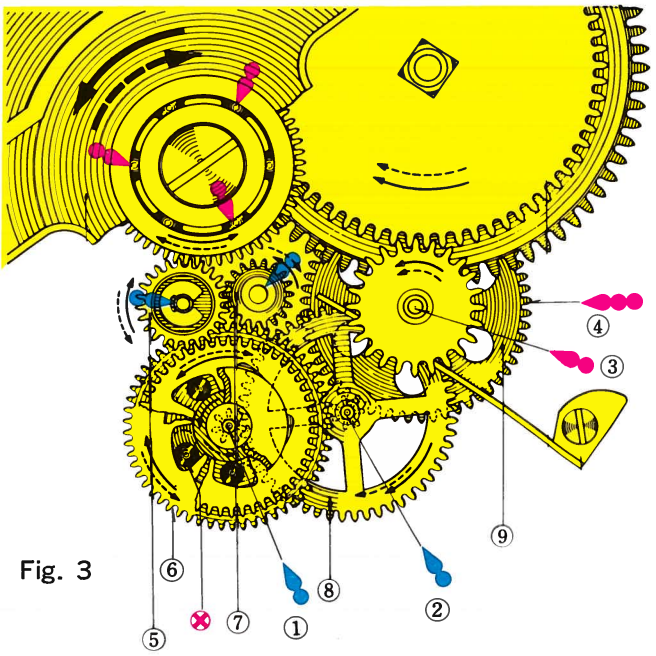
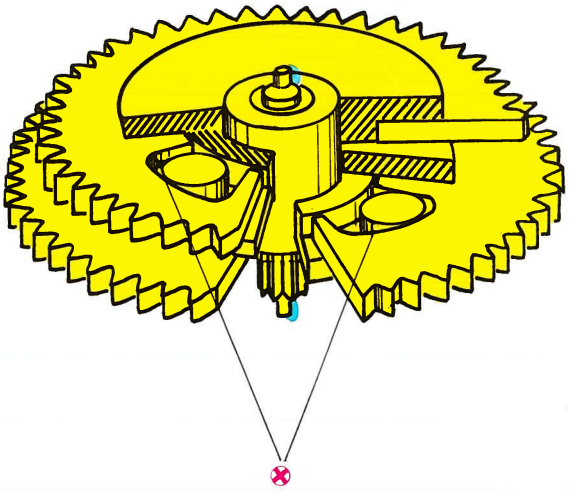


Fig. 3



Roller locking wheel

Oiling 8800C

1. Lubricating points and types of oil

Refer to { Front train wheel .....Fig. 1
Stop watch 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

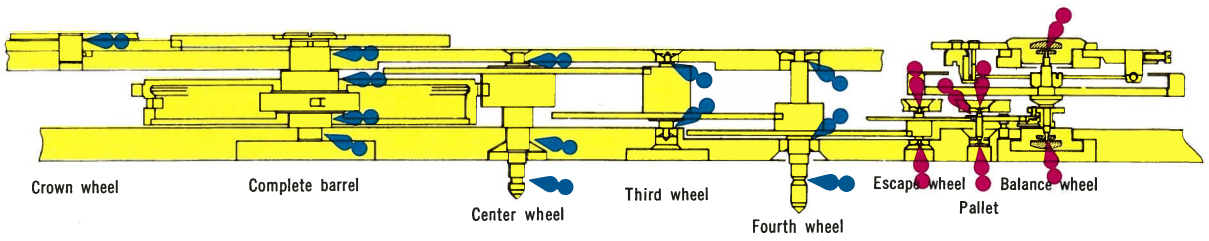


Fig. 1 Front Train Wheel

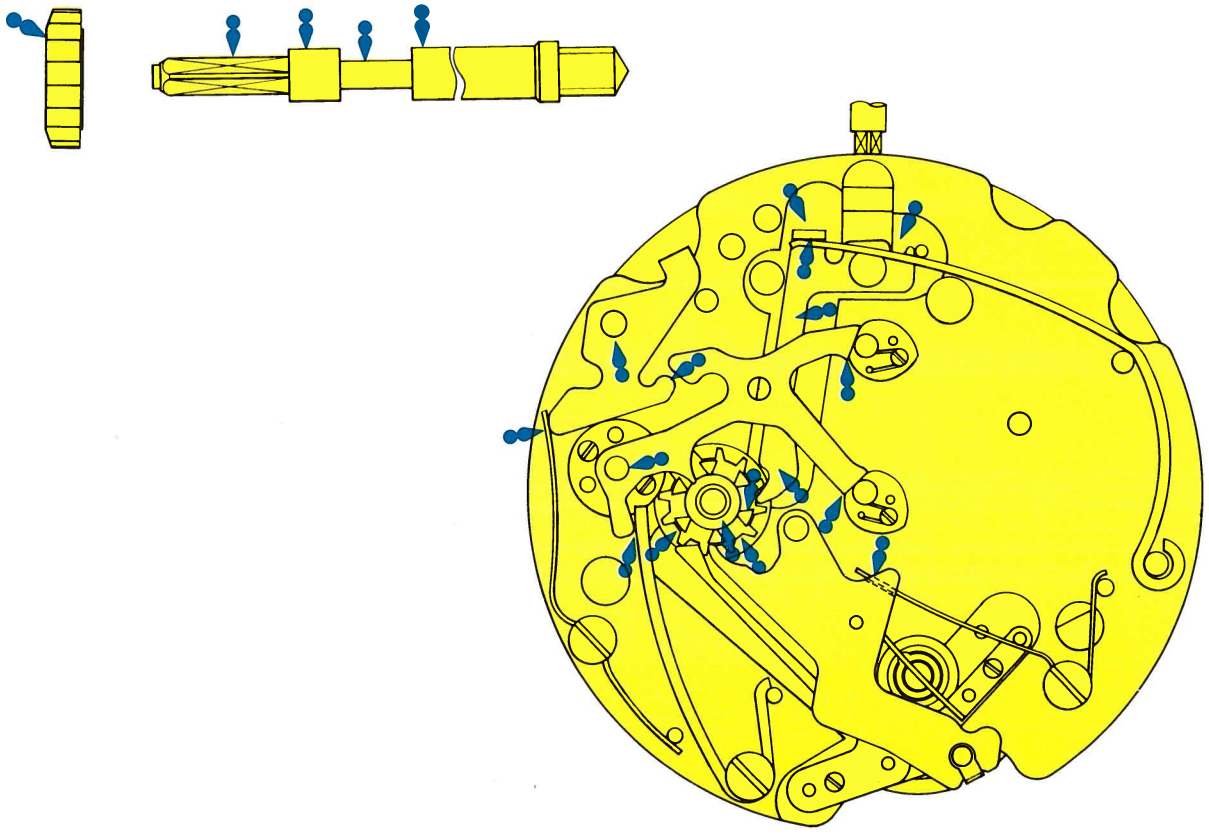


Fig. 2 Stop Watch Mechanism

2. Points requiring special attention in lubricating

Lubricating the stopping mechanism

○ Contacting portion of operating lever and plate: Since the operating lever rubs against the plate, sufficiently lubricate this portion with Seiko watch oil S-4. Fig. 3

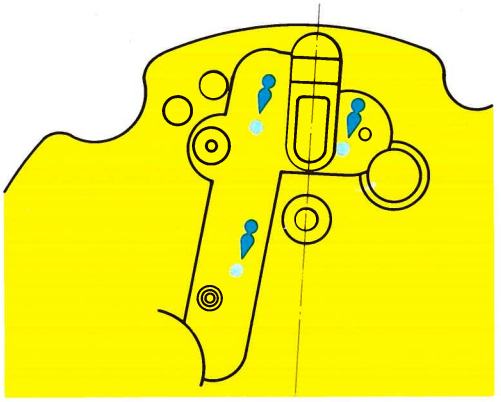


Fig. 3

○ Pillar wheel

Sufficiently lubricate column and ratchet. Fig. 4

Column : More than 4 portions

Ratchet : More than 3 portions

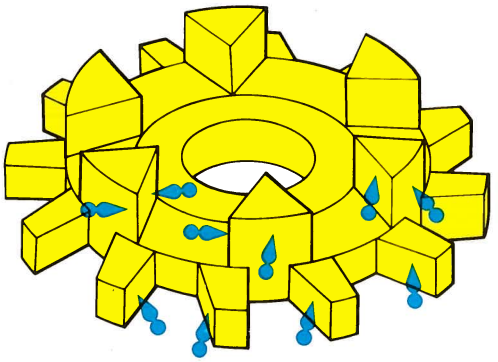


Fig. 4

○ Hammer

Lubricate the side face contacting the heart or heart side. Fig. 5 Fig. 6

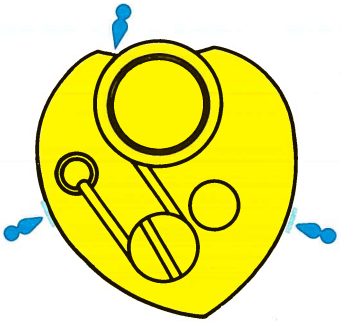


Fig. 6

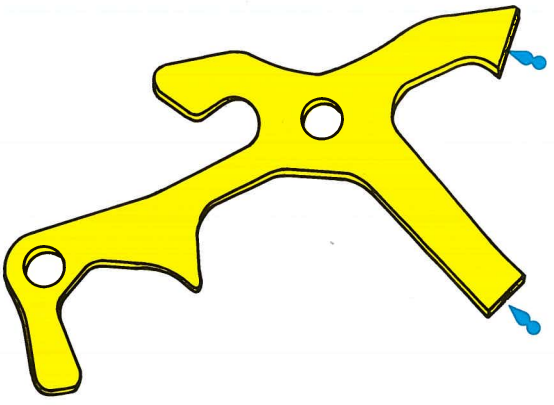


Fig. 5

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—⑦⓪
Assemble by reversing the above order: Figs. ⑦⓪—①

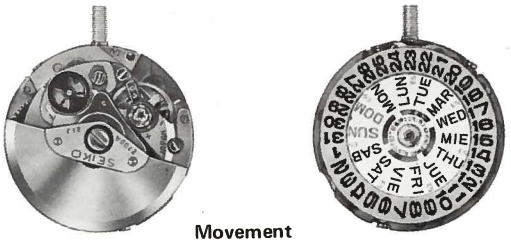
4) Lubrication:
Colored symbols in the illustrated figures indicate the types of oil, the quantity to be applied, and the lubricating points.

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

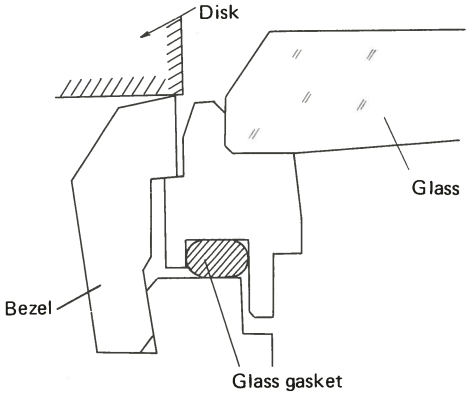
As lubricating points other than portions marked with the above symbols are separately indicated, lubricate correctly.

⊗ Oil must not be applied.



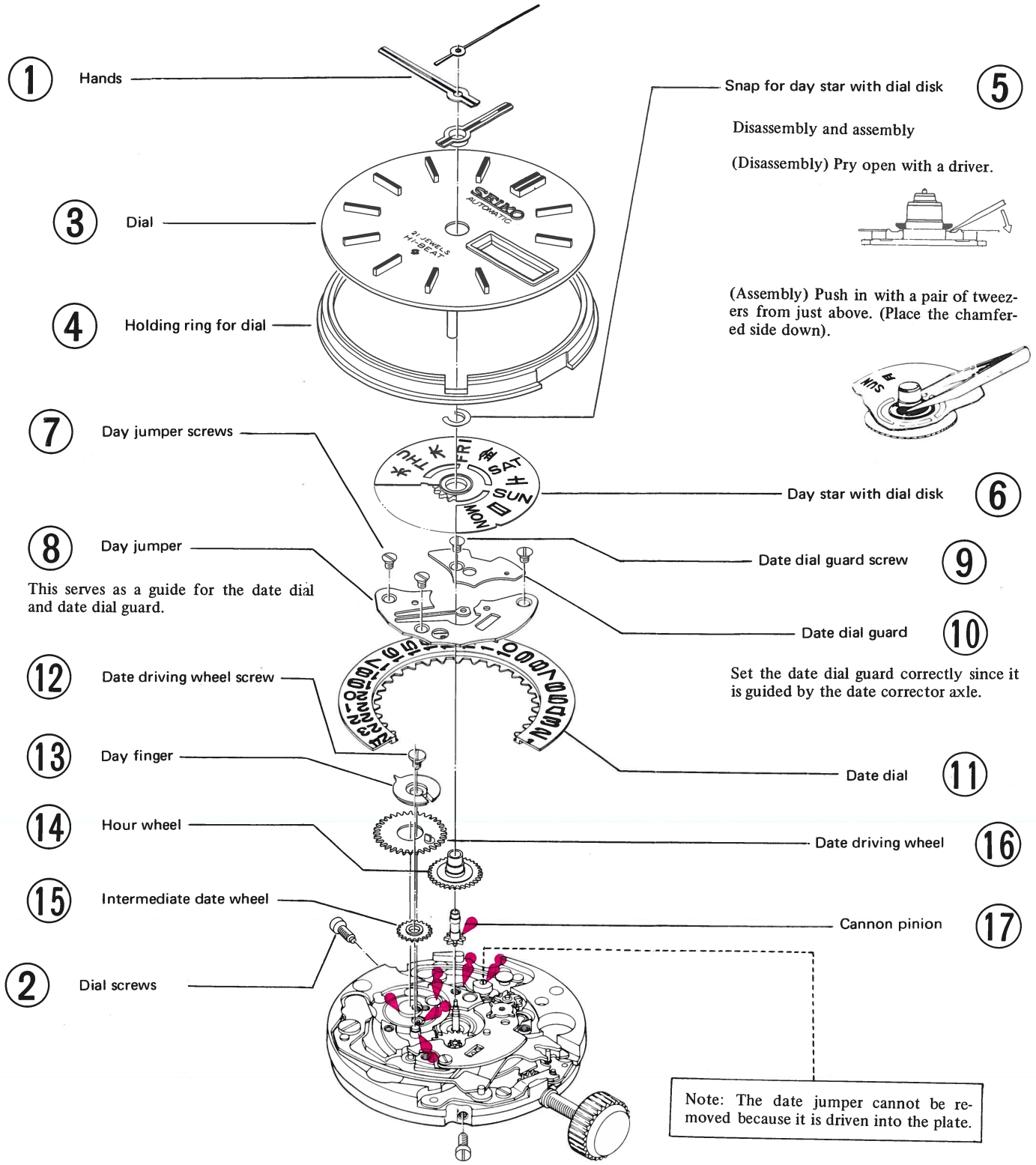
Movement

An example of casing construction
There is a model whose construction has the following glass portion.



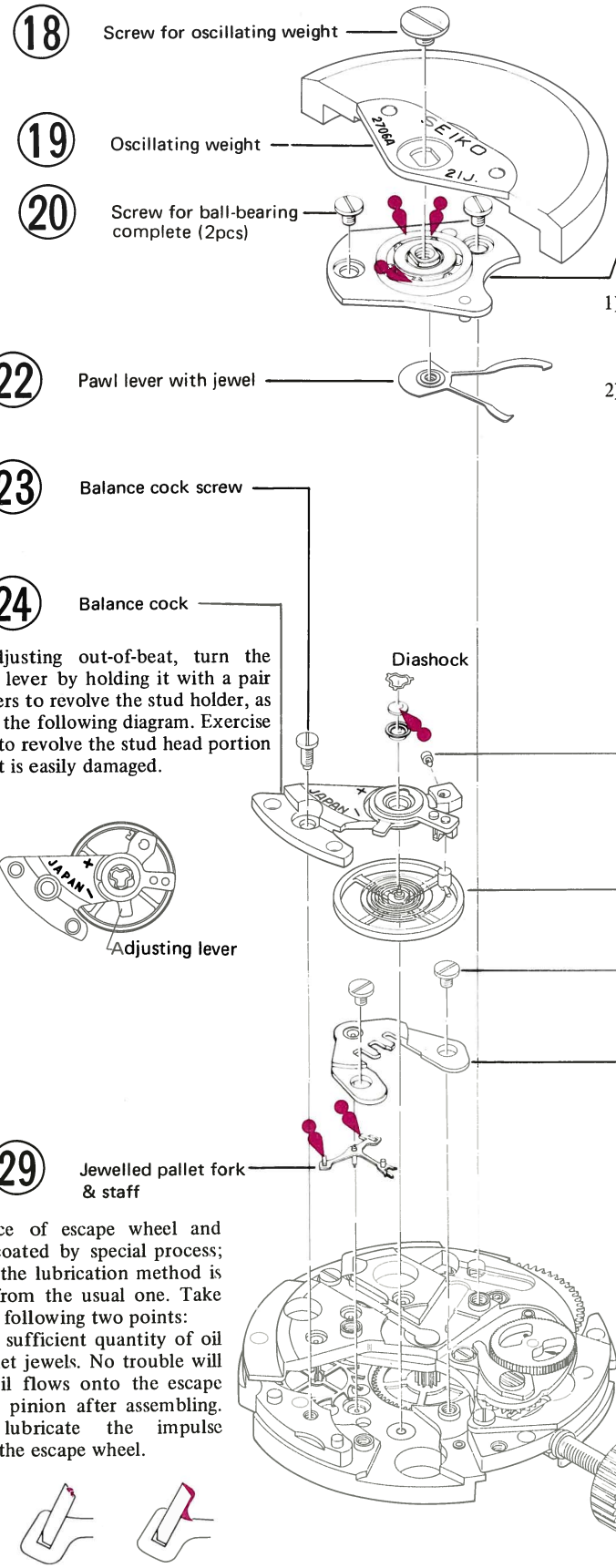
Precautions when assembling
(1) Insert a gasket into the gasket groove and set the bezel; then push the bezel in.
(2) Use a disk which does not contact the glass ring when pushing in the bezel by the disk.
(3) Set the pry opening port on the bezel to its original position.
(4) It is unnecessary to apply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

2706A Calendar Mechanism



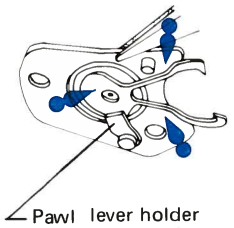
Note: The day and date setting device and bilingual change-over mechanism for day indication will not operate from 8:30 P.M. to 3:30 A.M. since this period is used for day and date driving time.

2706A Automatic Winding, Escapement and Governor Mechanism

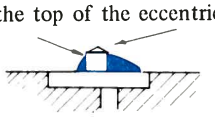


To prevent damage and springing out of the pawl lever when removing the ball bearing, pawl lever holder is provided as shown in the following diagram. Pay attention to the following points:

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.



Never lubricate the top of the eccentric pin.



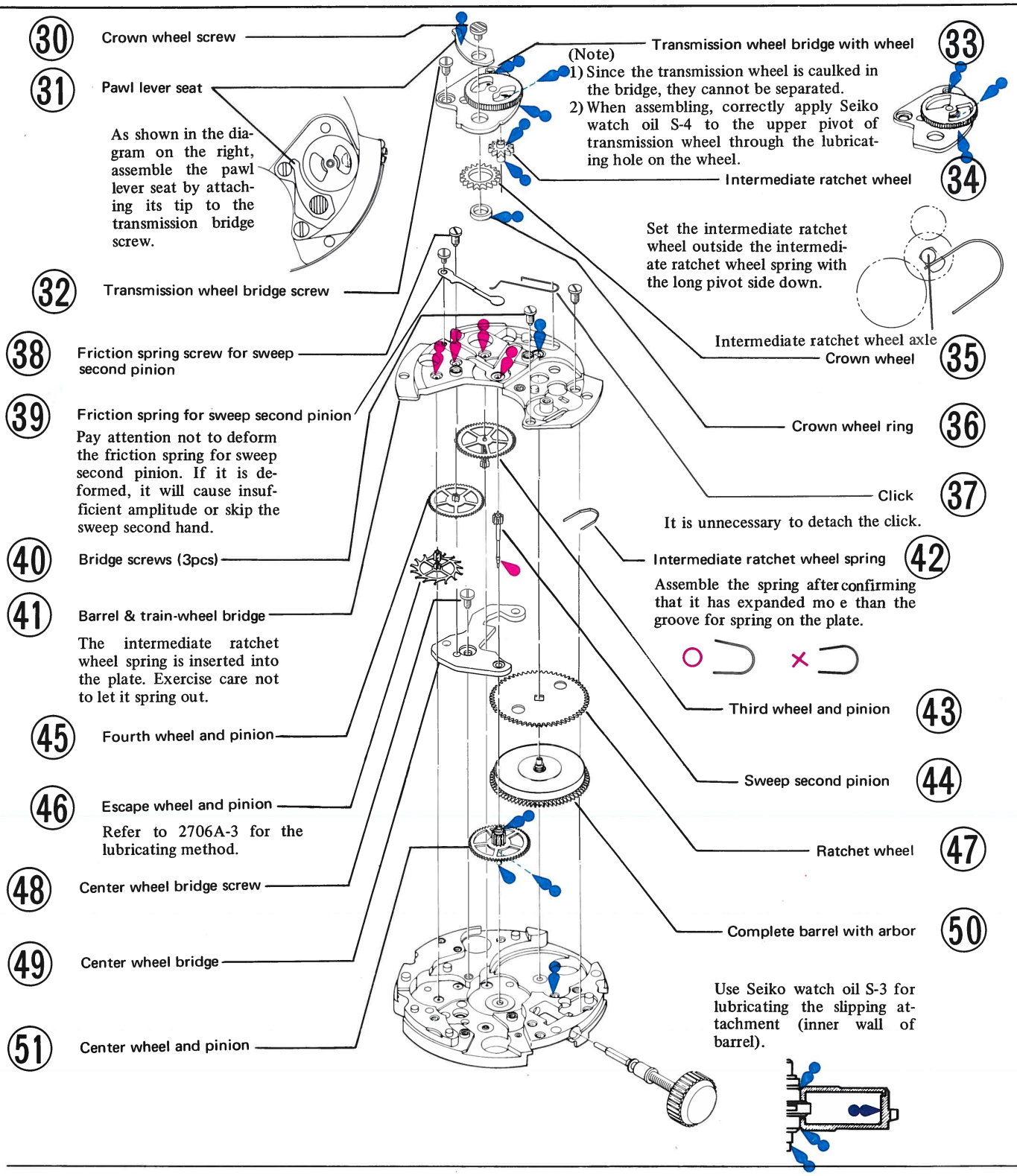
When adjusting out-of-beat, turn the adjusting lever by holding it with a pair of tweezers to revolve the stud holder, as shown in the following diagram. Exercise care not to revolve the stud head portion because it is easily damaged.

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.

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.

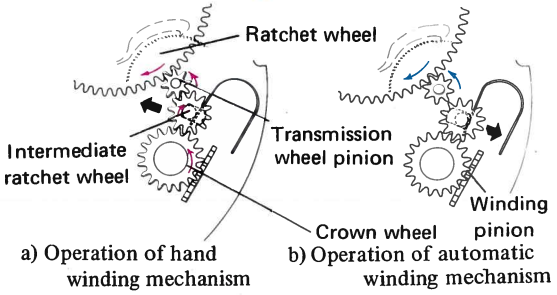
2706A Train Wheel

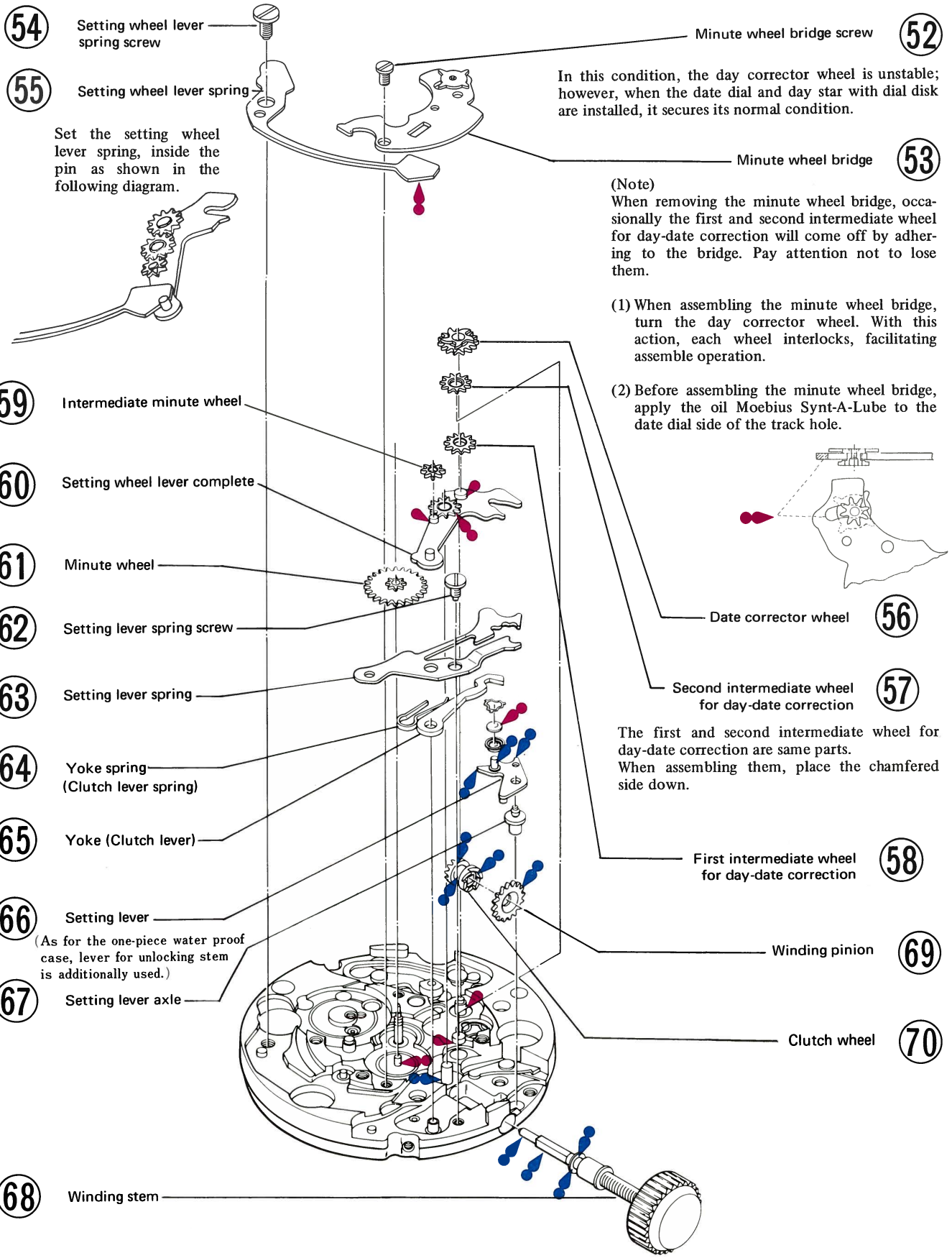


Hand winding mechanism

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.




54 Setting wheel lever spring screw
55 Setting wheel lever spring
Set the setting wheel lever spring, inside the pin as shown in the following diagram.
Minute wheel bridge screw 52
In this condition, the day corrector wheel is unstable; however, when the date dial and day star with dial disk are installed, it secures its normal condition.
Minute wheel bridge 53
(Note)
When removing the minute wheel bridge, occasionally the first and second intermediate wheel for day-date correction will come off by adhering to the bridge. Pay attention not to lose them.
(1) When assembling the minute wheel bridge, turn the day corrector wheel. With this action, each wheel interlocks, facilitating assemble operation.
(2) Before assembling the minute wheel bridge, apply the oil Moebius Synt-A-Lube to the date dial side of the track hole.
59 Intermediate minute wheel
60 Setting wheel lever complete
61 Minute wheel
62 Setting lever spring screw
63 Setting lever spring
64 Yoke spring (Clutch lever spring)
65 Yoke (Clutch lever)
66 Setting lever
(As for the one-piece water proof case, lever for unlocking stem is additionally used.)
67 Setting lever axle
Date corrector wheel 56
Second intermediate wheel for day-date correction 57
The first and second intermediate wheel for day-date correction are same parts.
When assembling them, place the chamfered side down.
First intermediate wheel for day-date correction 58
Winding pinion 69
Clutch wheel 70
68 Winding stem

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

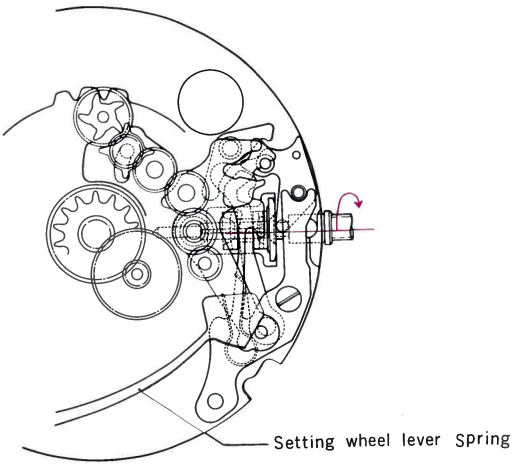


Fig. 1

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 (counter-clockwise), the date dial is quickly forwarded.

Fig. 2

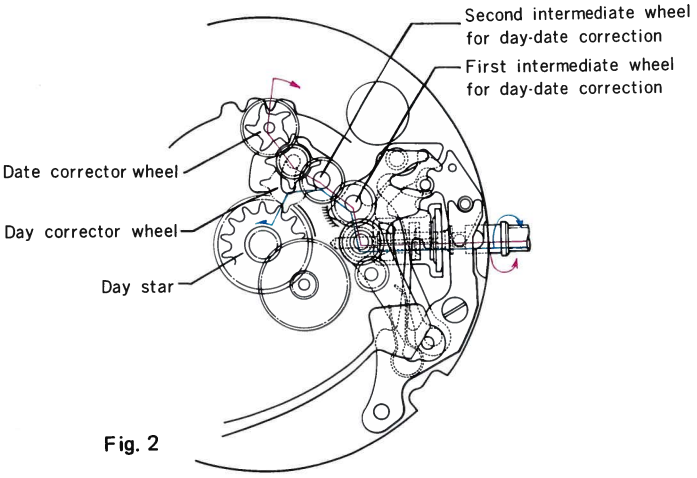


Fig. 2

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

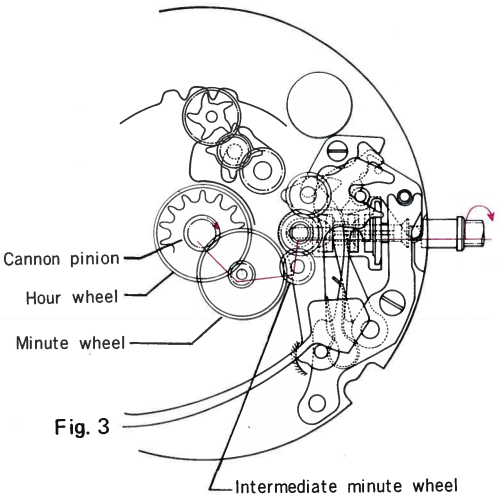


Fig. 3

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→⑮

Assemble by reversing the above: Figs. ⑮→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

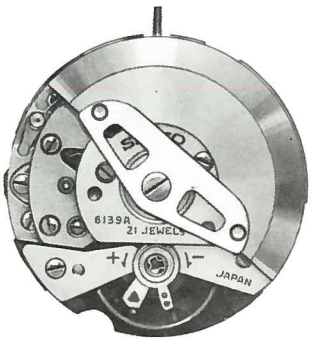
Colored symbols in the illustrated figures indicate the types of oil, its quantities to be applied, and lubricating points.

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

Oil quantity

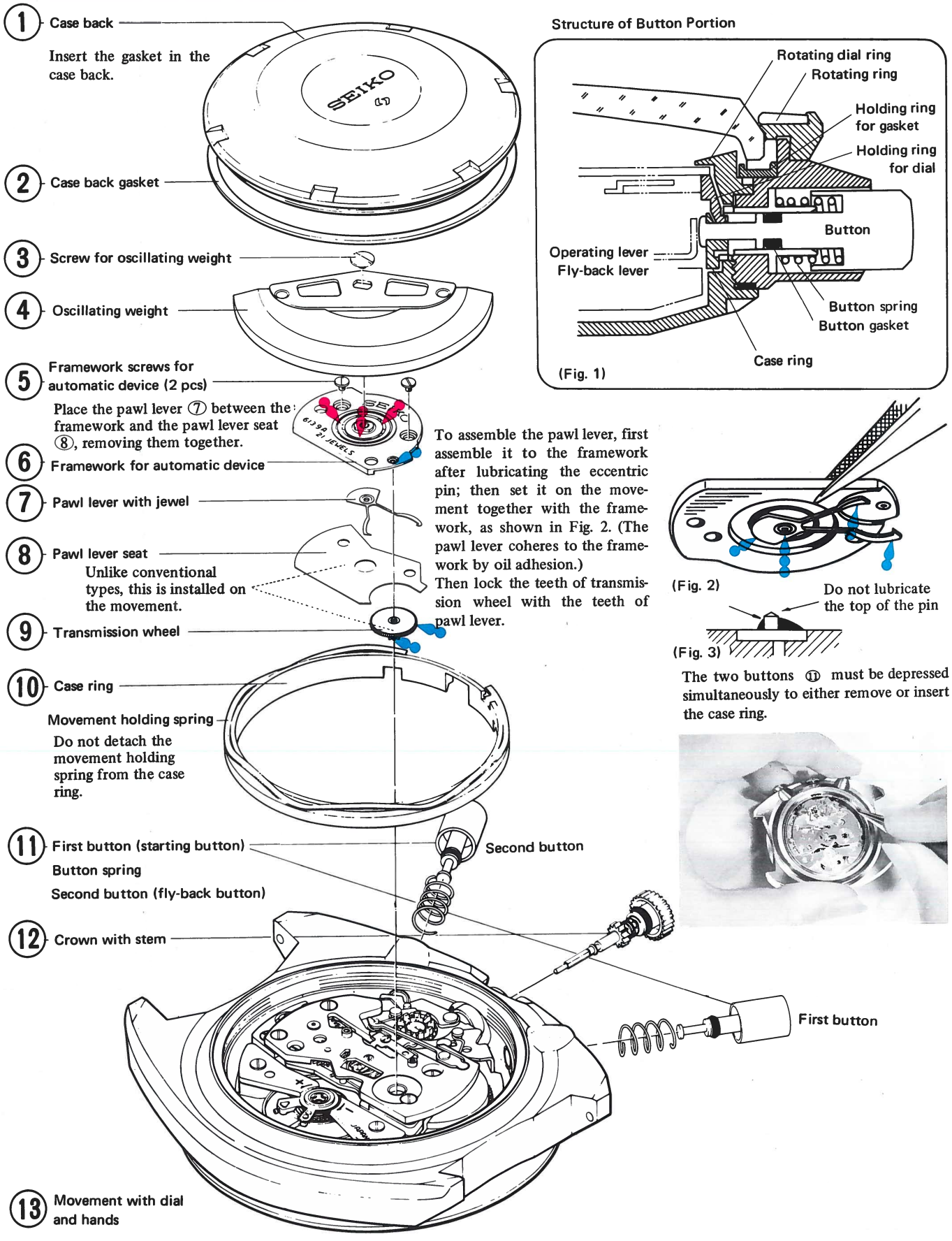
- Extremely small quantity
- Normal quantity
- Sufficient quantity
- Oil must not be applied

Note: Unindicated portions do not require lubrication.



Movement

6139A Automatic Winding Mechanism



Structure of Button Portion

(Fig. 1)

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.

(Fig. 2)

(Fig. 3)

The two buttons ⑪ must be depressed simultaneously to either remove or insert the case ring.

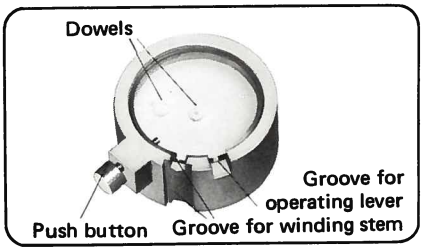
6139A Calendar Mechanism

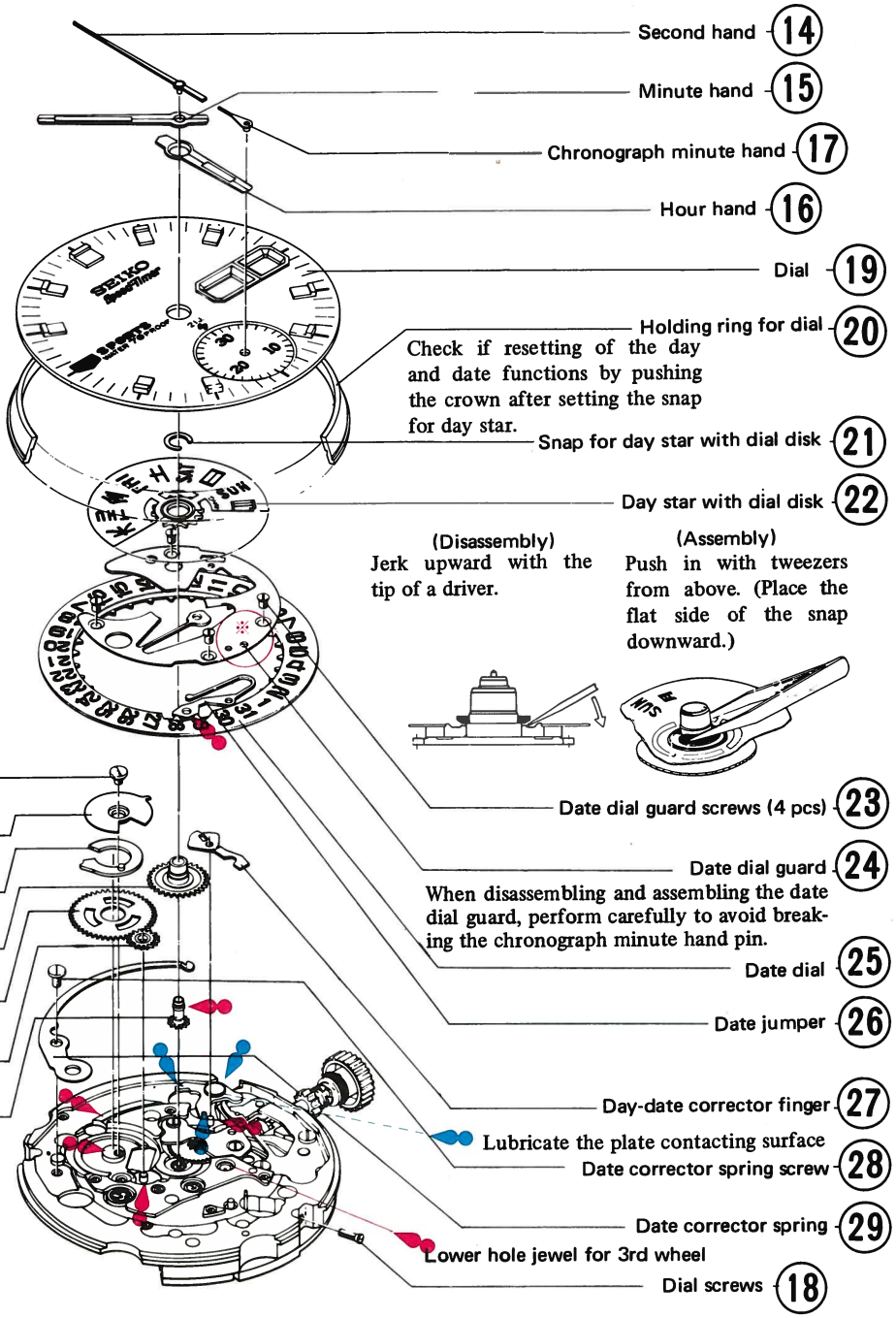
<Installing the second hand and chronograph minute hand>

(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.

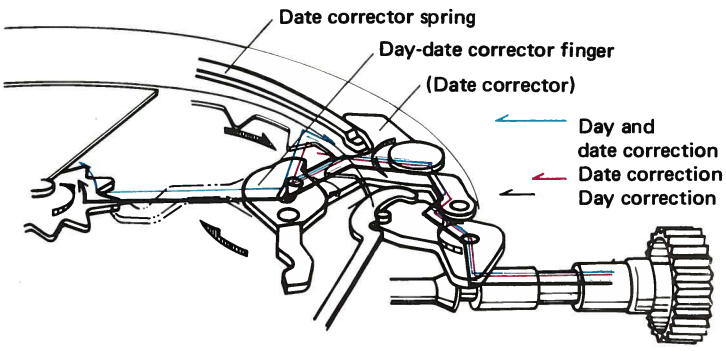
SEIKO provides a handy Movement Holder S-500 exclusively for 6139A, to facilitate hand-setting.





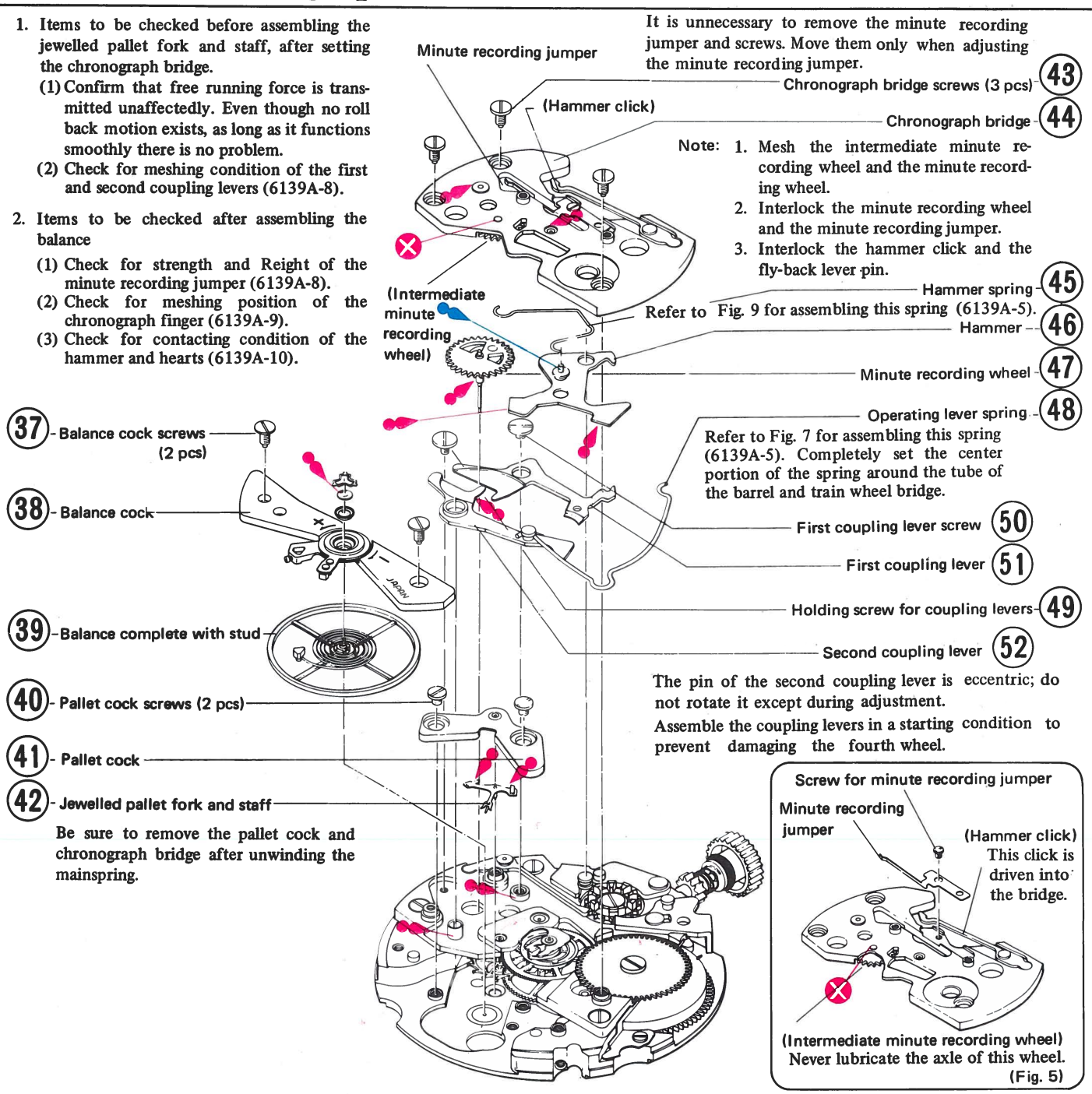
Calendar Mechanism

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.

Note:
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. 9 for assembling this spring (6139A-5).

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.

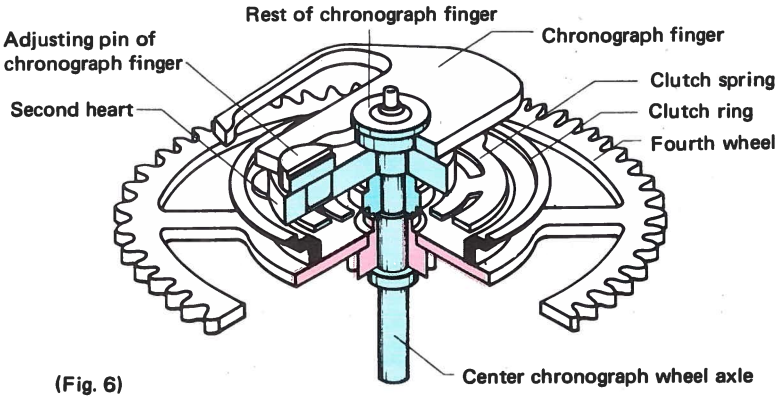
Be sure to remove the pallet cock and chronograph bridge after unwinding the mainspring.

Never lubricate the axle of this wheel. (Fig. 5)

Center Chronograph Wheel

The center chronograph wheel is conposed 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.



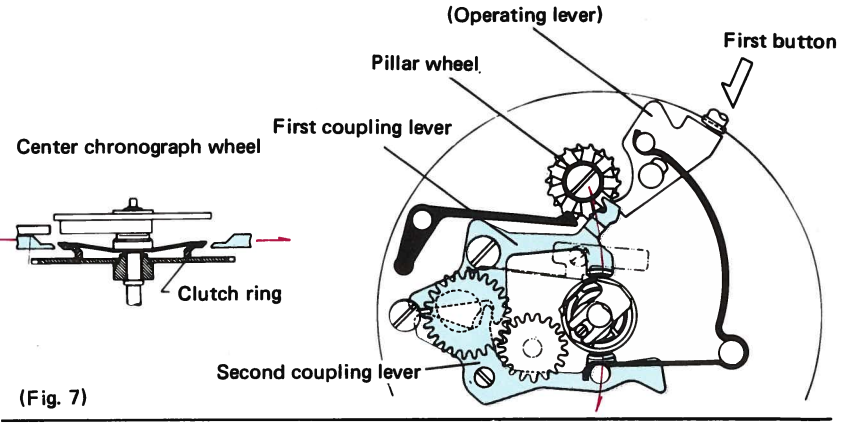
(Fig. 6)

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.

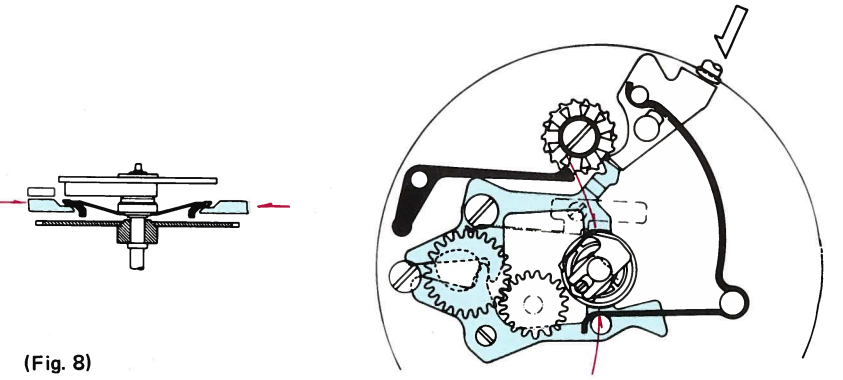
When the second hand makes a complete turn, the chronograph finger forwards the minute recording wheel one tooth through the intermediate minute recording wheel, operating the minute hand one graduation.



(Fig. 7)

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.


(Fig. 8)

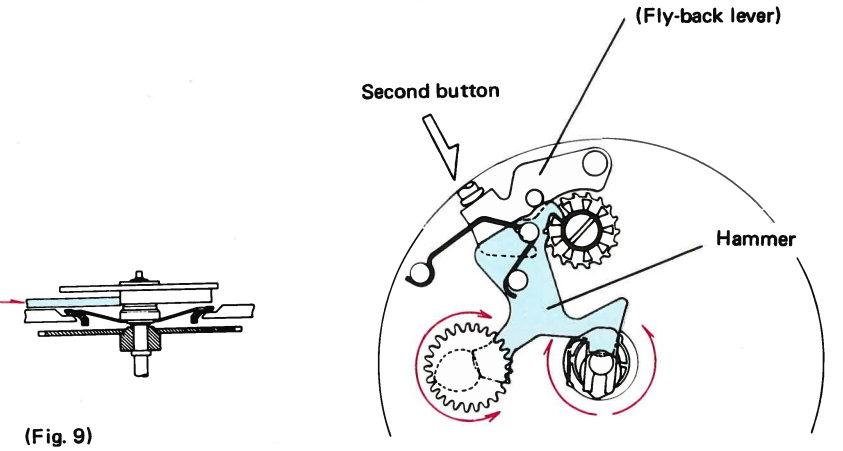
Accumulation

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.

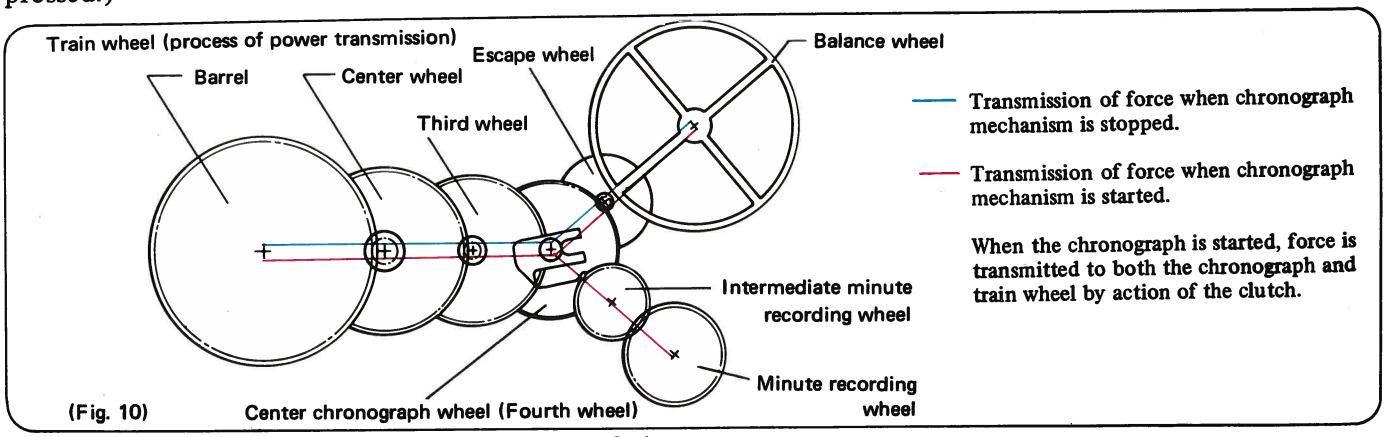
Resetting

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. 9)



(Fig. 10)

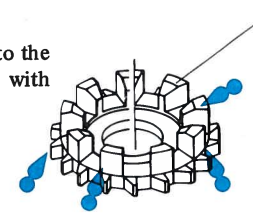
6139A Train Wheel

To prevent chipping, install the pillar wheel on the barrel and train wheel bridge before assembling the latter.

Lubricating the pillar wheel

Column

Assemble the pillar wheel to the bridge while interlocking with the pillar wheel jumper.



Pillar wheel screw

Pillar wheel

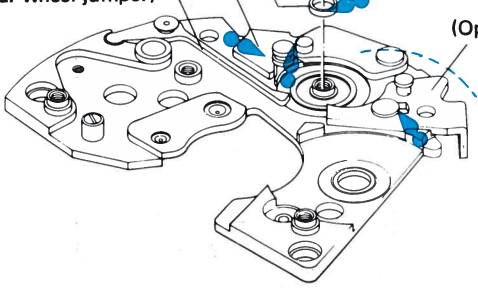
Pillar wheel ring

(Fly-back lever)

(Pillar wheel jumper)

(Operating lever)

Lubricate the contacting surface of the bridge



The operating lever, fly-back lever, and pillar wheel jumper are driven into the bridge.

Ratchet wheel screw 53

Ratchet wheel 54

Disassemble and assemble the bridge after the pillar wheel is assembled.

Click screw 55

Click

Barrel and train wheel bridge screws (3 pcs) 56

When disassembling and assembling the bridge, pay attention not to deform the clutch spring, chronograph finger and the fourth wheel and pinion.

Barrel and train wheel bridge 57

Center chronograph wheel 58

Pay attention to the center chronograph wheel while handling it.

Third wheel and pinion 59

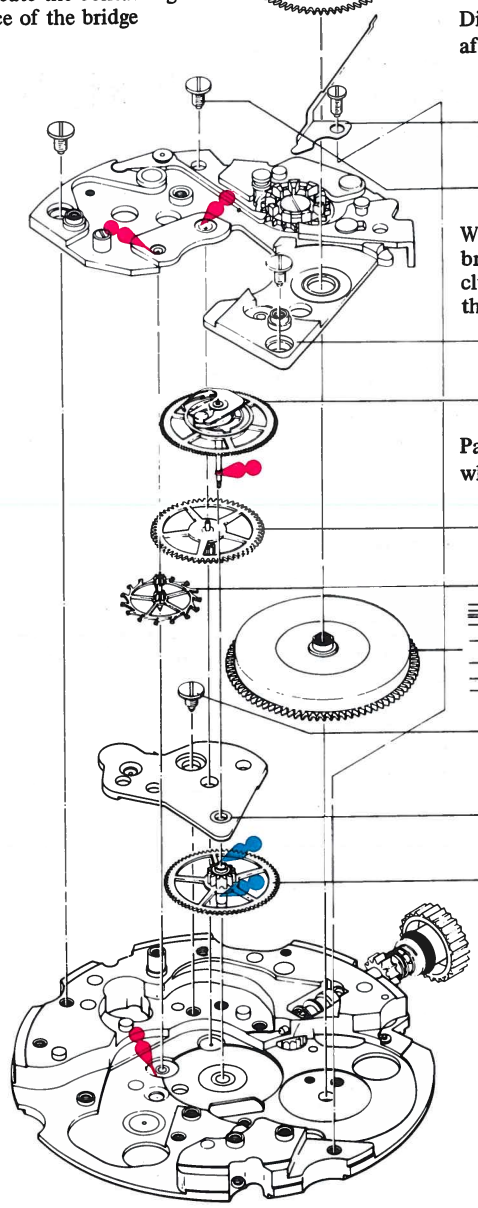
Escape wheel and pinion 60

Complete barrel with arbor 61

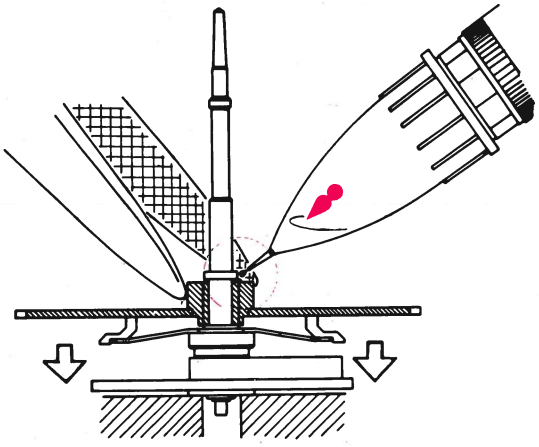
Center wheel bridge screw 62

Center wheel bridge 63

Center wheel and pinion 64

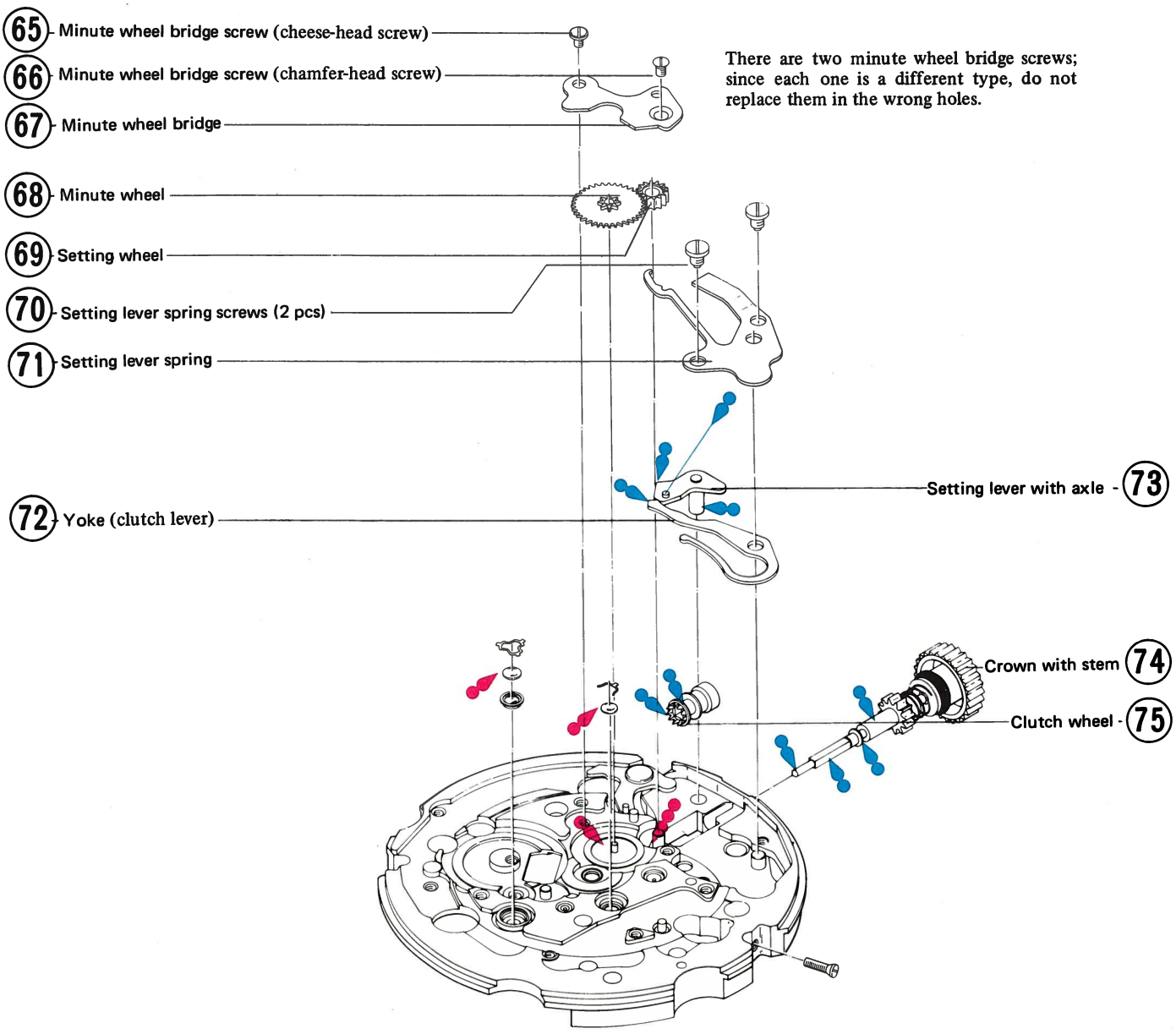


Lubricating the fourth wheel and pinion:
Set the center chronograph wheel on the staking tool as shown in the diagram; then lubricate the fourth wheel and pinion while depressing the wheel with a pair of tweezers.



(Fig. 11)

6139A Setting Mechanism



There are two minute wheel bridge screws; since each one is a different type, do not replace them in the wrong holes.

6139A Checking and Adjusting the Chronograph Mechanism-1

I. Checking and adjusting the coupling levers

1. 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:

   (1) 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.

   (2) 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.

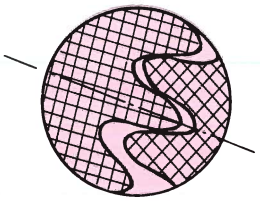
2. Clearance of coupling levers and clutch ring.

   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.



II. Checking and adjusting minute recording jumper

1. 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)

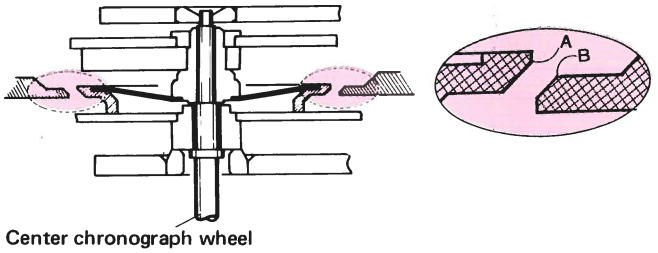
   Adjusting:

   Loosen the screw, and adjust the minute recording jumper by moving it to the right and left.

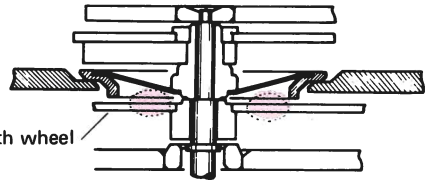
2. Height of the minute recording jumper

   Checking:

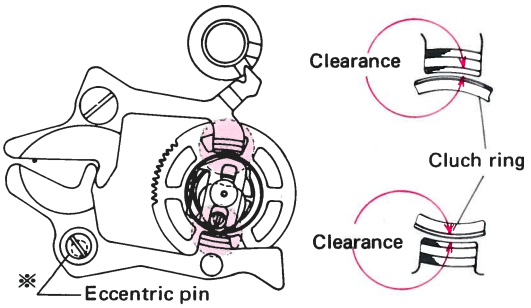
   (1) Elevation of the minute recording jumper from the upper level of minute recording wheel must be less than half the thickness of the minute recording jumper. (Fig. 16)



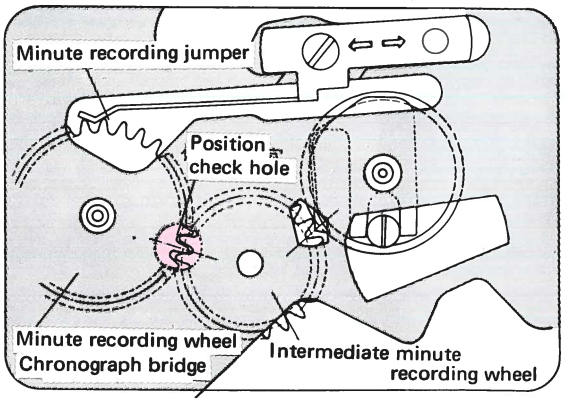
(Fig. 12)



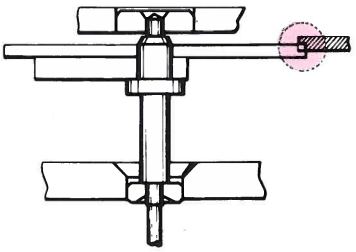
(Fig. 13)



(Fig. 14)



(Fig. 15)



(Fig. 16)

(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:

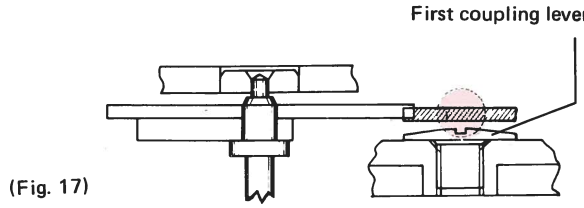
Check force of the minute recording jumper by strength of the mainspring.

(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.

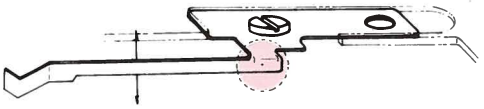
(2) Confirm that the minute recording jumper precisely regulates advance of the minute recording wheel. (Fig. 19)

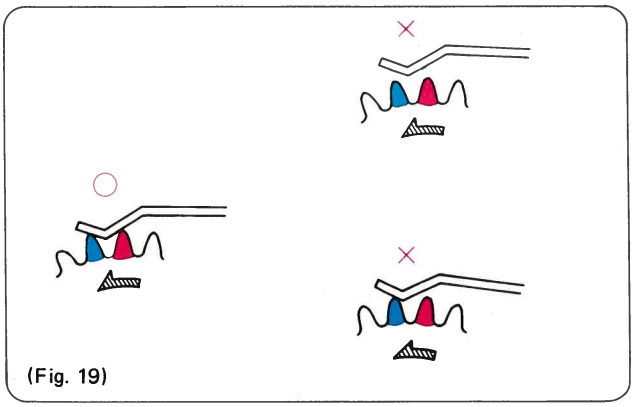
Adjusting:

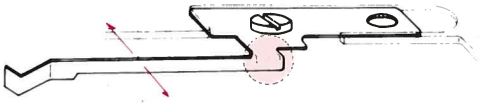
Bend the base of the minute recording jumper in either direction as indicated by arrows. (Fig. 20)



(Fig. 17)


(Fig. 18)


(Fig. 19)


(Fig. 20)

III. Adjusting the chronograph finger

1. Locking contact of chronograph finger

Checking:

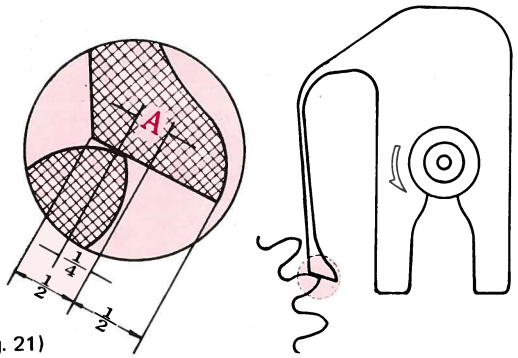
After correctly adjusting the position of minute recording jumper (refer to Adjust II-1), rotate the chronograph finger forward in a stopped condition, checking the degree with which the chronograph finger contacts the intermediate minute recording wheel.

(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).

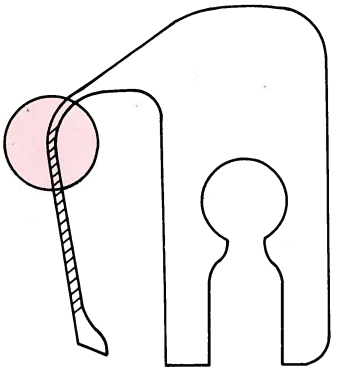
(2) The chronograph finger should not touch other teeth on both sides of the tooth contacting the intermediate chronograph wheel.

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.

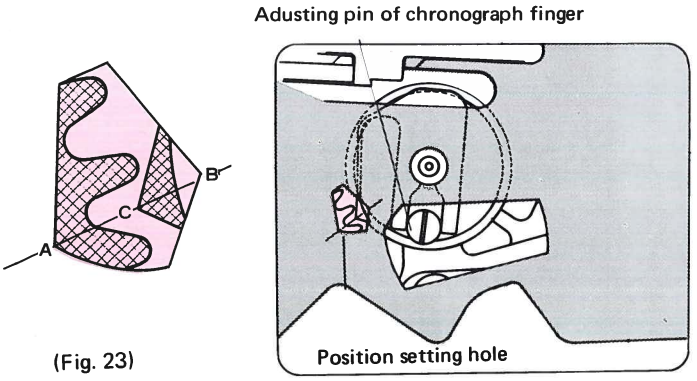


(Fig. 21)


(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.



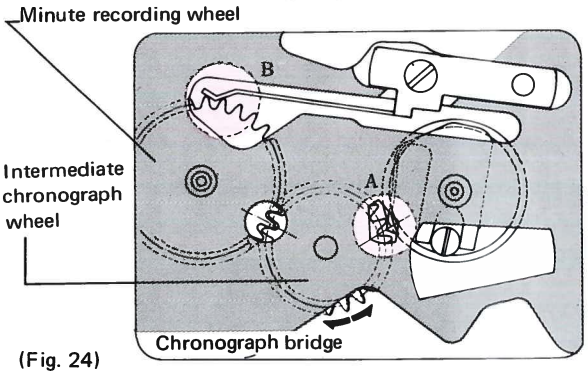
(Fig. 23)

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.

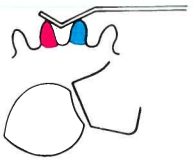
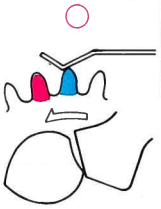
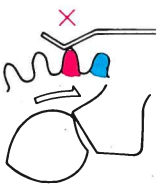
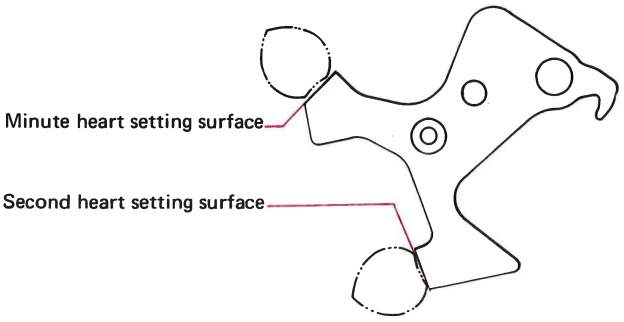
	Intermediate minute recording wheel: A		Minute recording wheel: B	
Free condition				
When turning A to the right	○ 	× 	○ 	× 
When turning A to the left	○ 	× 	○ 	× 
Adjustment	—	Polish second setting surface of the hammer	—	Polish second setting surface of the hammer

Table 1

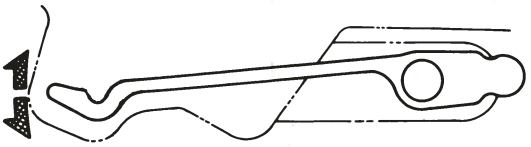
Adjusting:
When shakes exist in the second heart:
Polish setting surface of the hammer contacting the minute heart.
When shake of the minute heart is excessive (when passing over the crest):
Polish setting surface of the hammer contacting the second heart.
(Note) When polishing the hammer, slightly file the point parallel to the setting surface, finishing to a mirrored surface. (Fig. 25)



(Fig. 25)

V. Adusting pressing strength of the second button (fly-back button)

Checking:
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.

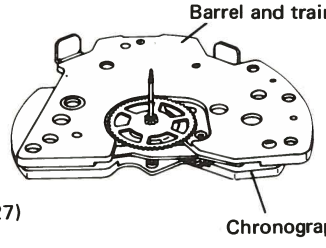

(Fig. 26)

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

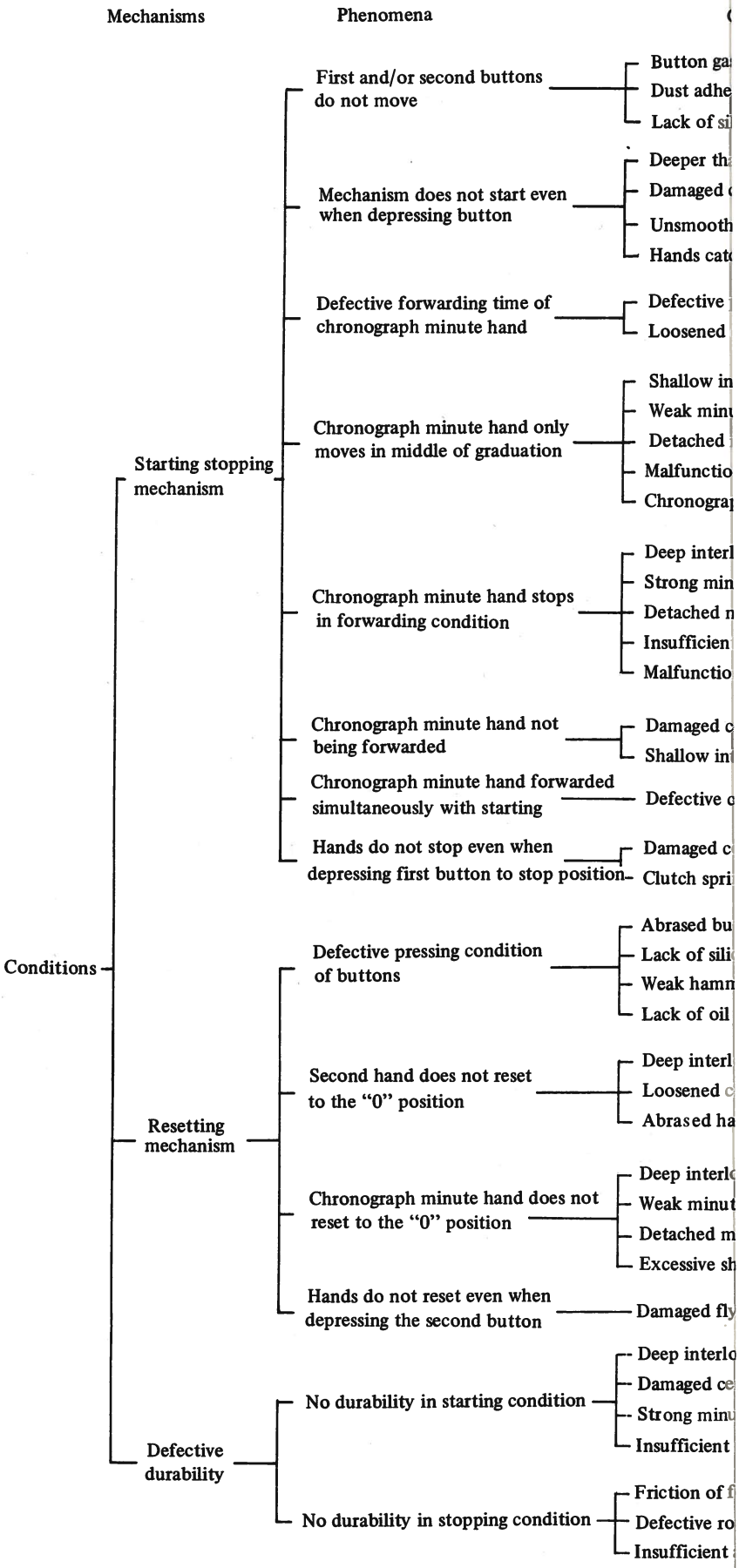
I. Repairing Method

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)

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



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 mainspring *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 mainspring *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

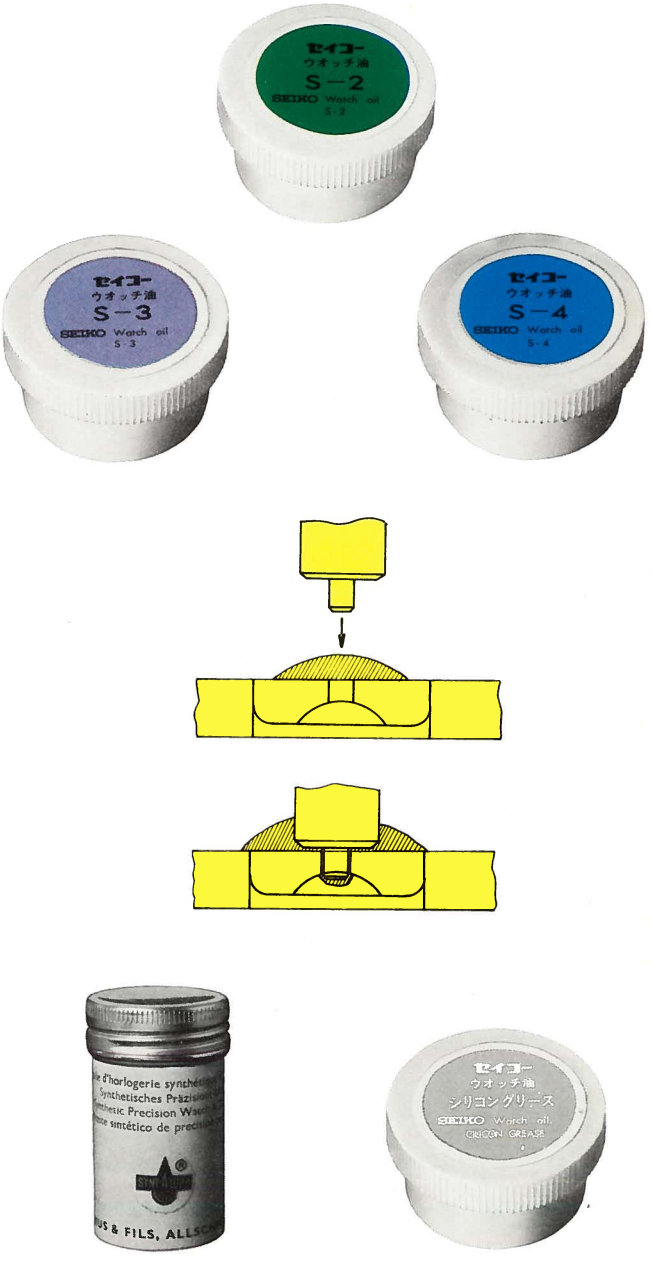
This lubricating oil is applied to those parts most sensitive to friction loss; for example, such as the pivot of front train wheel, pallet jewel, etc.

5. Silicon grease, 500,000 c/s

Use this grease for coating gaskets on outer parts, and to maintain airtight and waterproof 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.

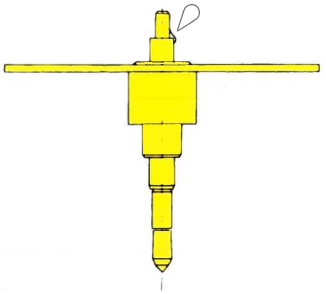
Small quantity	⊂
Normal quantity	⊂⊂
Sufficient quantity	⊂⊂⊂

Fig. 1

1. ⊂ : **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

Fig. 2



2. ⊂⊂ : **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

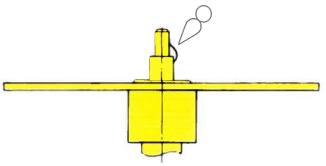


Fig. 3

3. ⊂⊂⊂ : **Sufficient quantity**

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

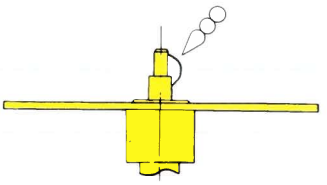


Fig. 4

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

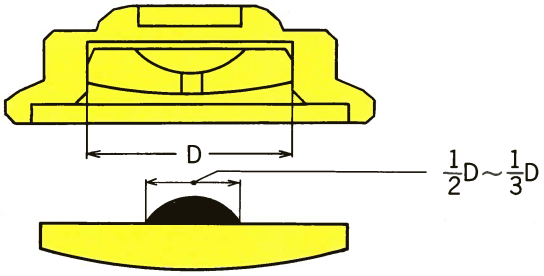


Fig. 1

· 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).

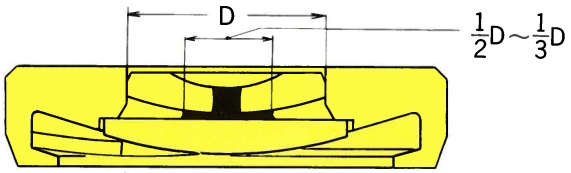


Fig. 2

· 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 asssembling 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).

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

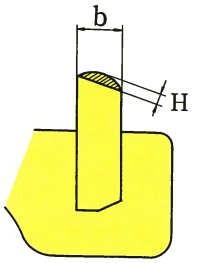


Fig. 3

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

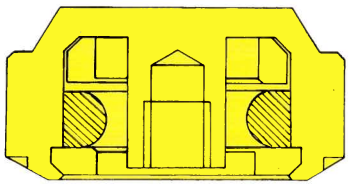
Since the hour wheel is assembled on the cannon pinion, the pressure on this cannon pinion and the hour wheel becomes so heavy in cases where movements have calendar mechanisms that it is necessary to apply only a small quantity of oil. When too much oil is applied, it will flow out to the dial and stain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

IV. Lubricating the Casing Parts (Case, Crown)

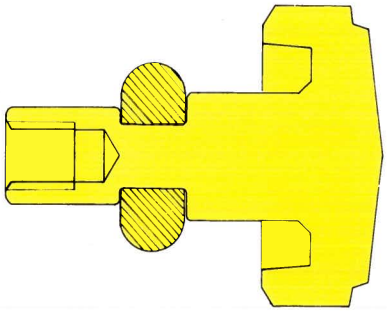
Apply silicon grease to the following portions (some differences may exist because outer construction varies):

1. **Case back gasket:** Apply thinly over entire surface

2. **Waterproof crown gasket**

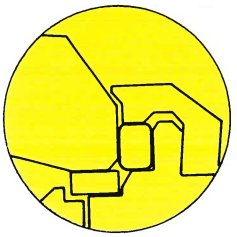


W type

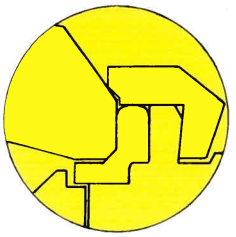


M type

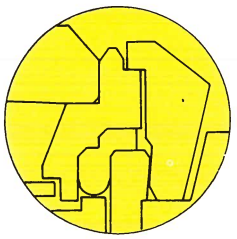
3. **Glass gasket**



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 cantacting the dial.

Oiling 1000C

1. Lubricating points and types of oil

Refer to { Front train wheel .....Fig. 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

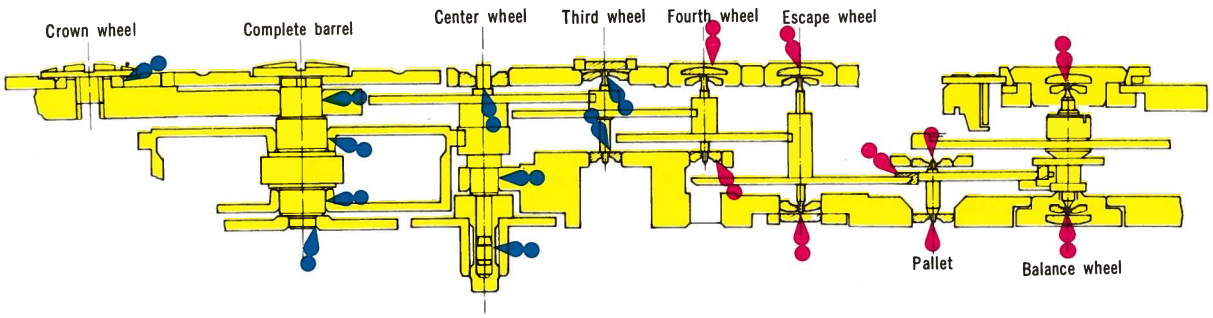


Fig. 1 Front Train Wheel

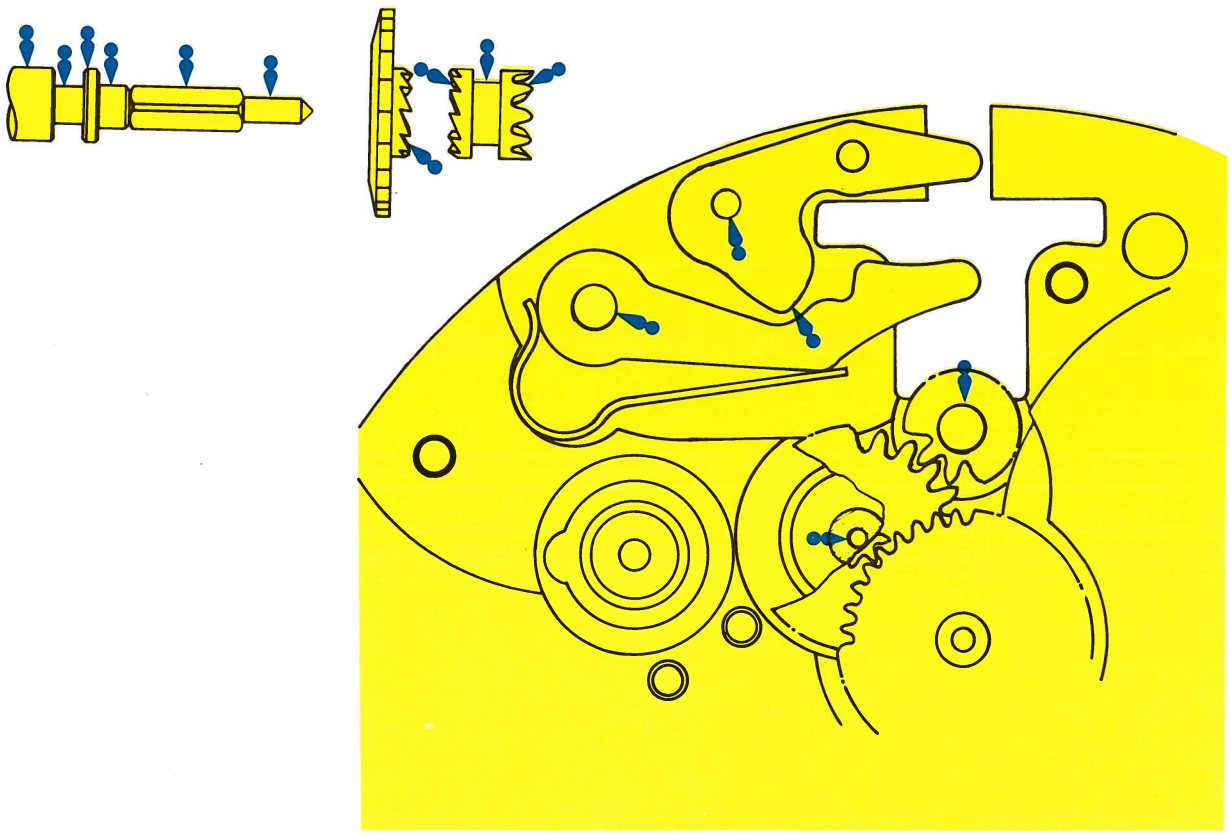


Fig. 2 Winding stem, Hand Setting Mechanism

Oiling 1104A

1. Lubricating points and types of oil

Refer to { Front train wheel .....Fig. 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

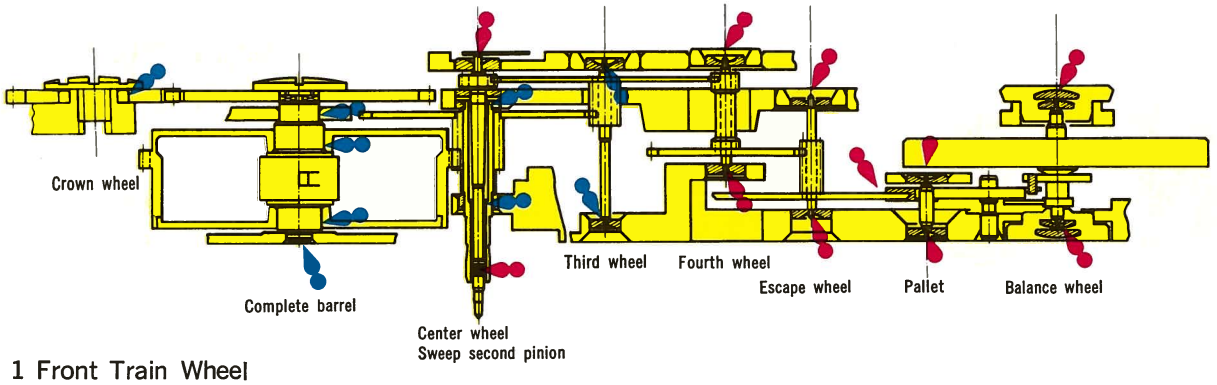


Fig. 1 Front Train Wheel

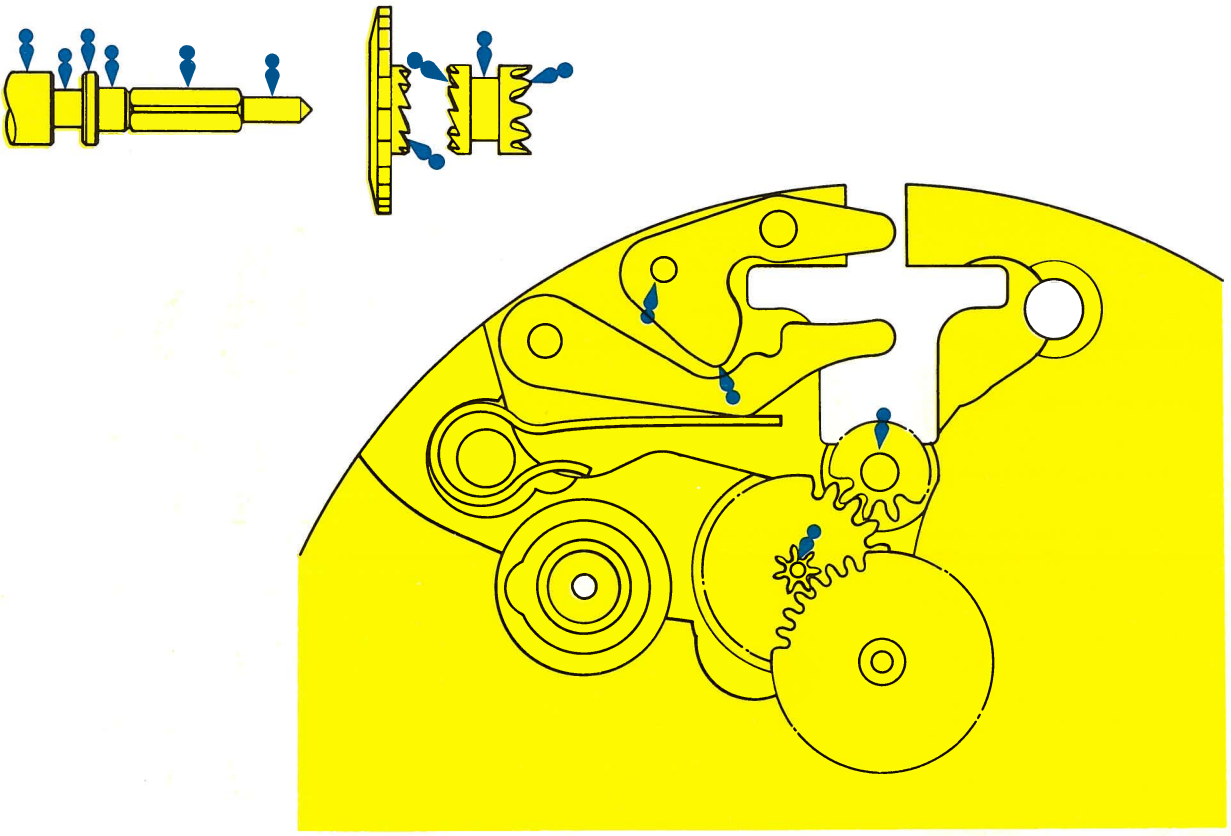


Fig. 2 Winding stem, Hand Setting Mechanism

SEIKO

Oiling Instruction

PREFACE

Lubrication plays an extremely important role in maintaining watch precision and smoothness, in preventing parts wear, and in supporting watch's waterproof function. Recent additional mechanisms—such as automatic winding, calendar, chronograph, alarm, and so forth—are greatly diversified. To sufficiently and smoothly actuate these comparatively complex functions, correct lubrication methods are increasingly in demand.

In view of these requirements, we have issued this SEIKO WATCH LUBRICATION MANUAL. In addition to general precautions to observe during lubrication, this manual describes various lubricating methods classified by each caliber, based on representative ones. By carefully reading this manual, all lubricating procedures concerned with the SEIKO Watches can be easily comprehended and effected.

We ask for your cooperation in making full use of this lubrication manual to give every possible after-sales servicing to the SEIKO Watches.

CONTENTS

This manual explains the lubrication systems for sixteen calibres which represent all SEIKO calibres. Therefore, the points of lubrication, types of oils, oil quantity, etc. are easily ascertainable by referring to the representative calibre.

For instance, if you want to know the lubrication system for calibre 2100, refer to calibre 1000, which represents 2100.

A list of representative calibres and their applicable calibres are as follows: