

PARTS CATALOGUE / TECHNICAL GUIDE

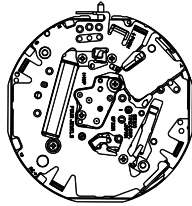
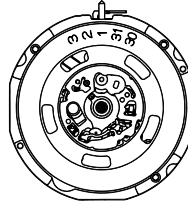
Cal. 4F32A, 8F32A

Cal. 8F33A, 8F35A

PARTS CATALOGUE / TECHNICAL GUIDE (p. 1 – 22)

CATÁLOGO DE PARTES / GUÍA TÉCNICA (p. 23 – 44)

[SPECIFICATIONS]

Item		Cal. No.	4F32A	8F32A	8F33A	8F35A
Movement						
			The illustrations refer to Cal. 8F32A. (x 1.0)			
Movement size	Outside diameter		ø18.5 mm 17.7 mm x 18.5 mm	ø26.4 mm 25.6 mm x 25.6 mm		
	Casing diameter		ø18.5 mm 17.1 mm x 18.5 mm	ø26.4 mm 24.8 mm x 24.8 mm		
	Height (including the battery portion)		3.9 mm	4.3 mm		
Time indication			3 hands (hour, minute and second hands)			
Driving system			<ul style="list-style-type: none"> • Step motor (for hour, minute and second hands) • Ultrasonic motor (for calendar indication) 			
Additional mechanism			<ul style="list-style-type: none"> • Calendar (Leap year indication, month and date) Perpetual calendar up to February 28, 2100 • Train wheel setting device • Electronic circuit reset switch • Battery life indicator • Day calendar (Cal. 8F33A) • Instant calendar (day) setting device (Cal. 8F33A) 			
Loss/gain			Annual rate at normal temperature range: less than 20 seconds			
Regulation system			Logical regulation (Pattern cutting system: 3 steps)			
Measuring gate by quartz tester			Use 10-second gate.			
Battery	Battery No.		SEIKO CR1612, Sony CR1612, Matsushita CR1612	SEIKO CR2412, Matsushita CR2412		
	Voltage		3.0 V			
	Battery life		Approx. 5 years	Approx. 10 years		Approx. 8 years
Jewels			4 jewels			

PARTS CATALOGUE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

Disassembling procedures Figs. : ① → ④③


Reassembling procedures Figs. : ④③ ← ①

Lubricating: Types of oil

 Moebius A

 Moebius F

Oil quantity

 Normal quantity

Ex. : Cal. 8F32A

Note for Cal. 8F32A and 8F35A:

When the hands and the dial are removed, the dial spacer will come off if the movement is turned over. Take care not to lose the dial spacer.

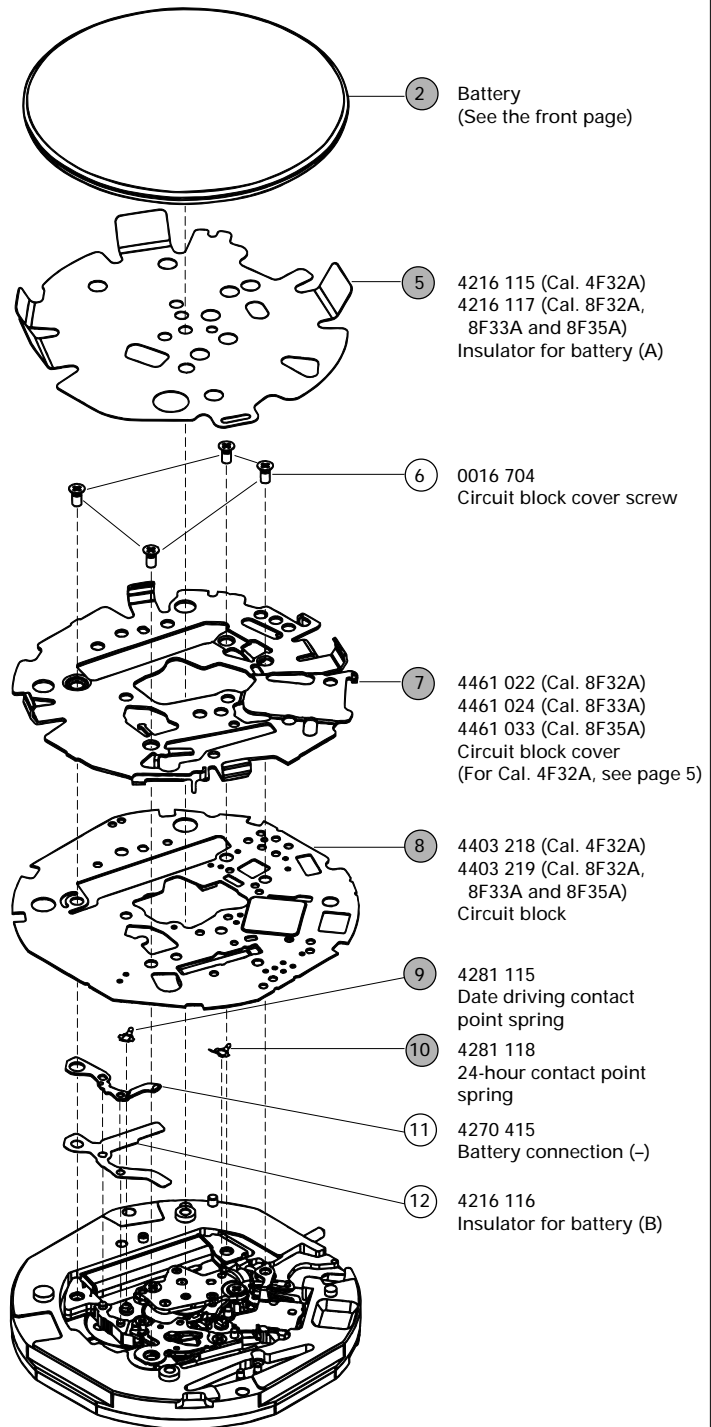
* For disassembling and reassembling, use the movement holder for exclusive use with the respective calibres.

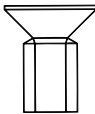

● For the dial side:

- Movement holder 4F3-T for Cal. 4F32A
- Movement holder 8F3-T for Cal. 8F32A, 8F33A and 8F35A

● For the case back side:

- Movement holder 4F8F-C for all Cal. 4F and 8F Series



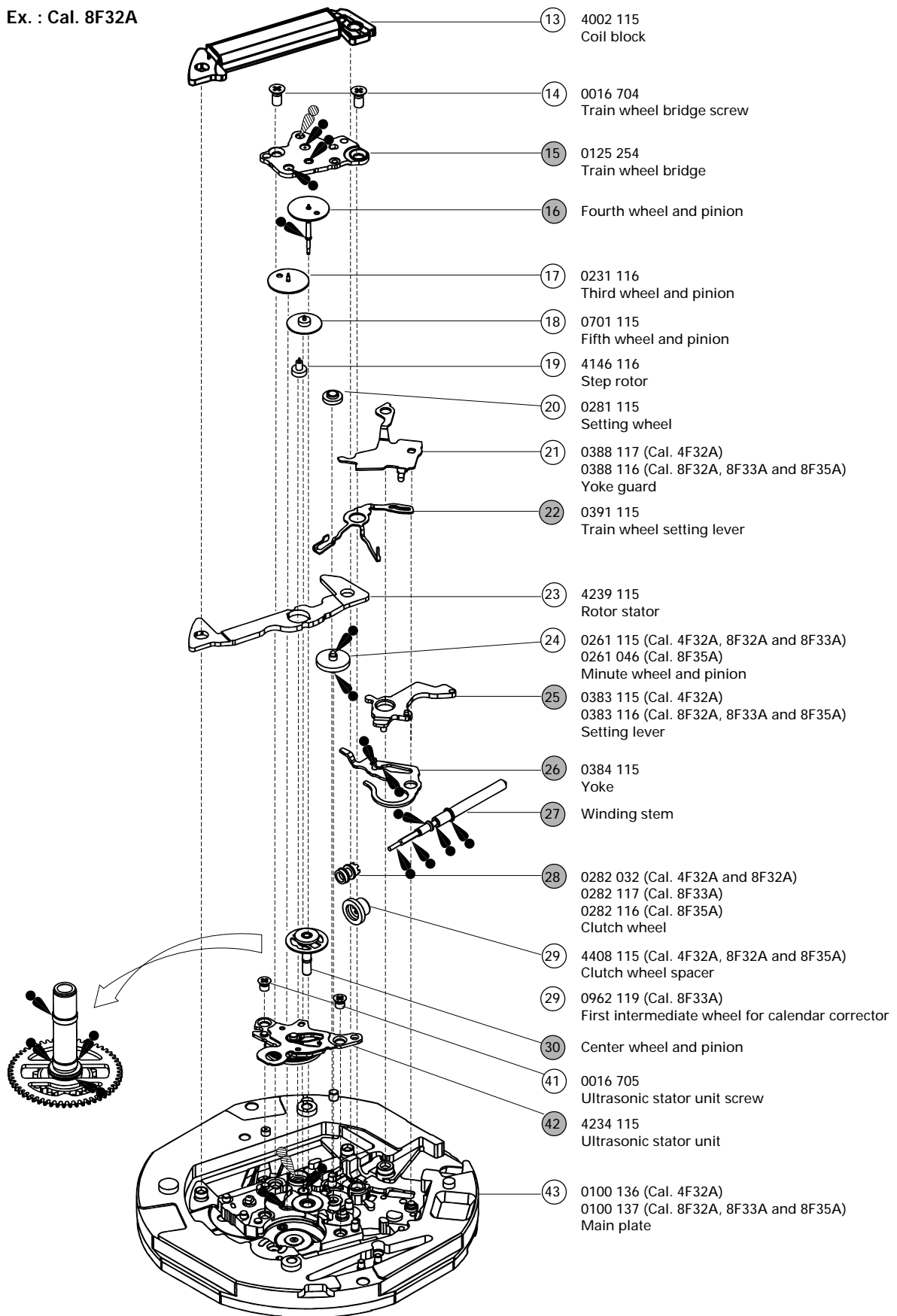
	0016 704 • Circuit block cover screw (4 pcs.) • Train wheel bridge screw (2 pcs.)
	0016 705 • Ultrasonic motor screw (2 pcs.)

  Please see the remarks on the following pages.

PARTS CATALOGUE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

Ex. : Cal. 8F32A



● ➔ Please see the remarks on the following pages.

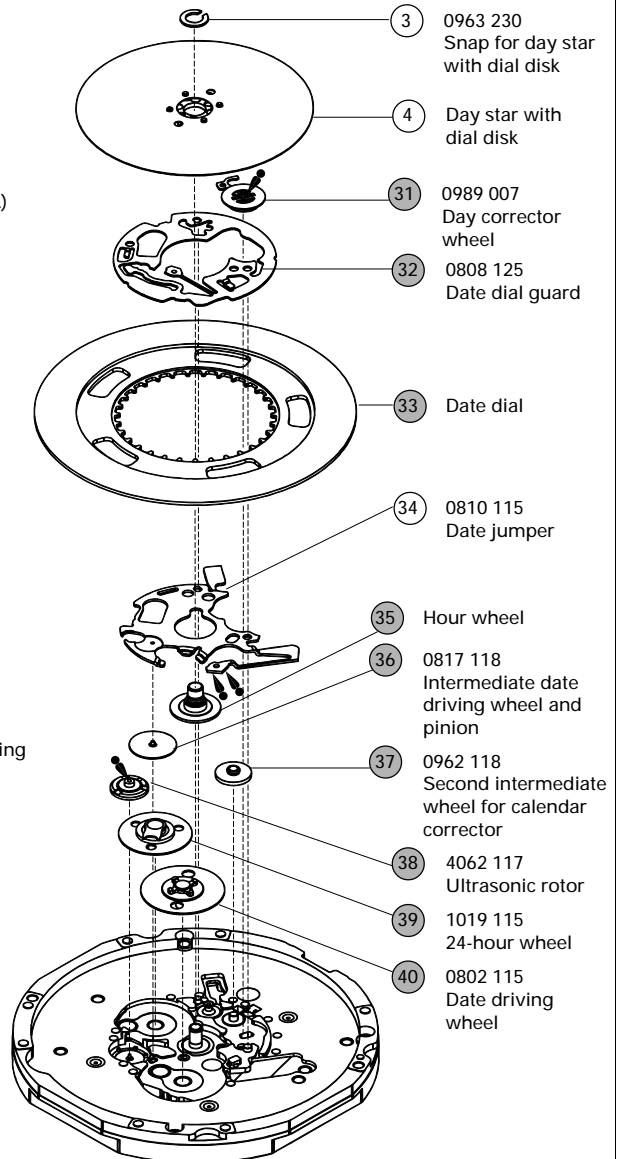
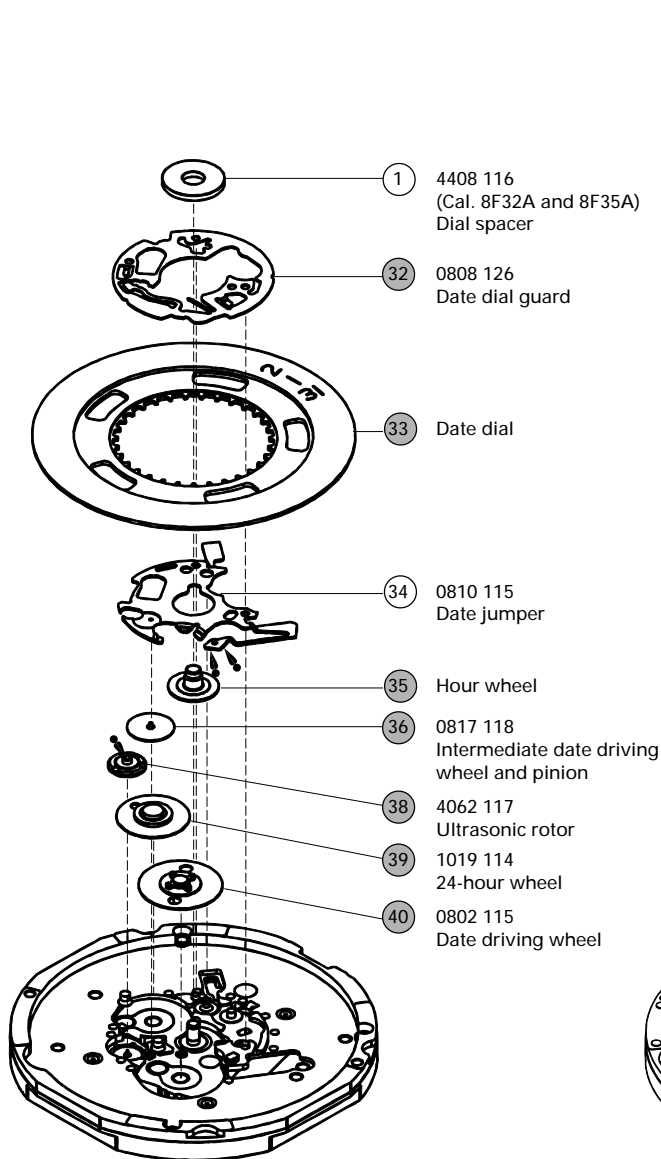
PARTS CATALOGUE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

Cal. 4F32A, 8F32A & 8F35A

Cal. 8F33A

Ex. : Cal. 8F32A



* Cal. 4F32A, 8F32A and 8F35A do not use the parts (3), (4), (31) and (37).

● ➔ Please see the remarks on the following pages.

PARTS CATALOGUE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

Remarks:

● **Back plate**

Some models do not use the back plate.

● **Case ring**

The type of case ring is determined based on the design of cases.

Check the case number and refer to "SEIKO Casing Parts Catalogue" to choose a corresponding case ring.

④ Day star with dial disk (Only for Cal. 8F33A)

Cal. No.	Part code	Position of crown and calendar frame	Color of figure	Color of background
8F33A	0170 072	3 o'clock	Black	White

The type of day star with dial disk is determined based on the design of cases.

Check the part code printed on the disk.

⑦ Circuit block cover

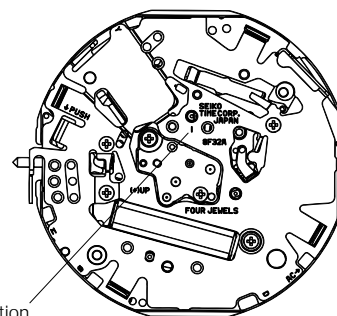
⑬ Fourth wheel and pinion

③① Center wheel and pinion

③⑤ Hour wheel


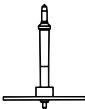


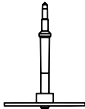

• **Discrimination of the hand installation height**

Cal. 4F and 8F Series watches have numerals printed on movement to indicate the hand installation height. When repairing, refer to the table below.



Numeral for discrimination

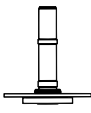
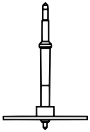

[Cal. 4F32A]

Numeral for discrimination	Circuit block cover	Center wheel and pinion	Fourth wheel and pinion	Hour wheel
1	4461 021	 0221 116	 0241 449	 0273 118
2	4461 020	 0221 114	 0241 448	 0273 117

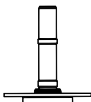
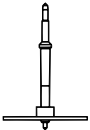

PARTS CATALOGUE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

[Cal. 8F32A and 8F33A]

Numeral for discrimination	Center wheel and pinion	Fourth wheel and pinion	Hour wheel
2	 0221 115	 0241 446	 0273 115

[Cal. 8F35A]

Numeral for discrimination	Center wheel and pinion	Fourth wheel and pinion	Hour wheel
2	 0221 123	 0241 446	 0273 115

②⑦ Winding stem 0351 196

The type of winding stem is determined based on the design of cases.

Check the case number and refer to "SEIKO Casing Parts Catalogue" to choose a corresponding winding stem.

③③ Date dial

Cal. No.	Part code	Position of crown and calendar frame	Color of figure	Color of background
4F32A	0878 321	3 o'clock	Black	White
8F32A 8F33A	0878 301	3 o'clock	White	Black
8F35A	0878 301	4 o'clock	White	Black

The type of date dial is determined based on the design of cases.

Check the case number and refer to "SEIKO Casing Parts Catalogue" to choose a corresponding date dial.

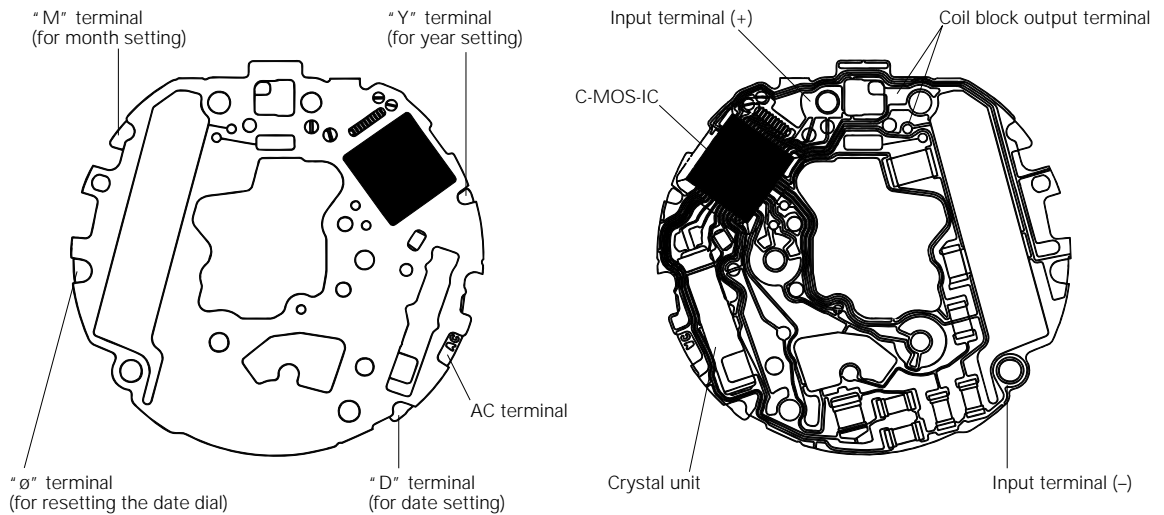
TECHNICAL GUIDE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

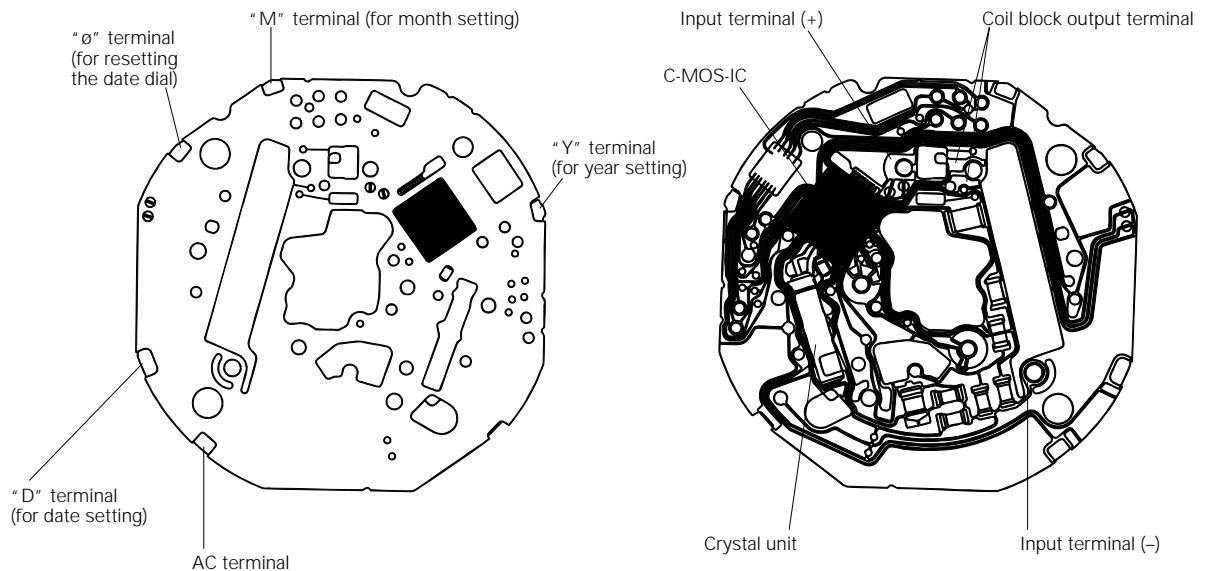
- The explanation here is only for the particular points of Cal. 4F32A, 8F32A, 8F33A and 8F35A.
- For the repairing, checking and measuring procedures, refer to the "TECHNICAL GUIDE, GENERAL INSTRUCTIONS".

I. STRUCTURE OF THE CIRCUIT BLOCK

[Cal. 4F32A]



[Cal. 8F32A, 8F33A and 8F35A]



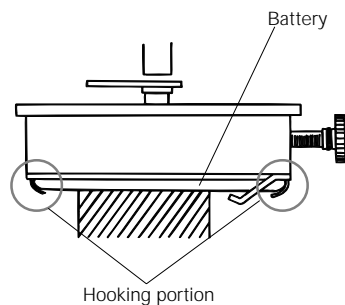
II. REMARKS ON DISASSEMBLING AND REASSEMBLING

- For disassembling and reassembling, use the movement holder for exclusive use with the respective calibres.
- When installing the hands, place the movement directly on a flat metal plate or a riveting plate.

● Hour, minute and second hands

• How to set the hands

With the battery installed, place the movement directly on a flat metal plate or a riveting plate, taking care not to press down the hooking portions.



To install the hands:

Turn the crown clockwise until the date changes, and install the hands so that they point to the 12 o'clock position.

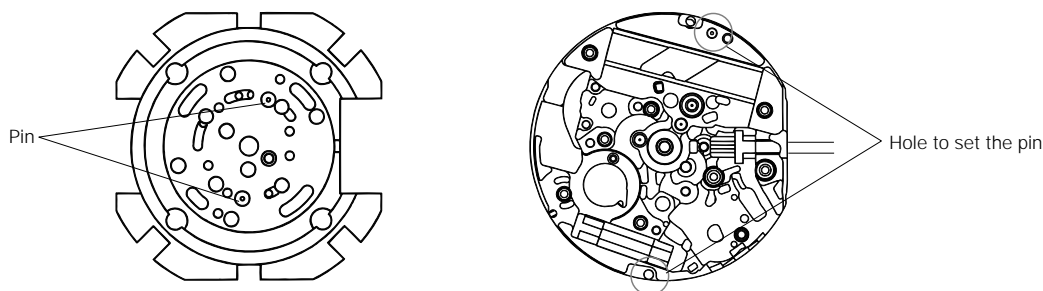
To install the hands so that the date changes more accurately as the hands indicate 12 o'clock midnight:

- 1) Turn the crown clockwise until the date changes.
- 2) Give the crown four counterclockwise turns to make the date return to the previous date.
- 3) Turn the crown slowly clockwise until the date changes again.
- 4) Install the hands so that they point to the 12 o'clock position.

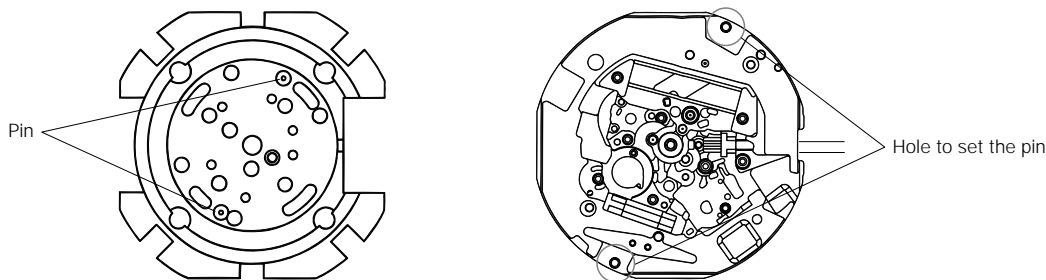
• Setting position of the movement on the exclusive movement holder

Check that the pins of the movement holder are securely set to the corresponding holes of the movement.

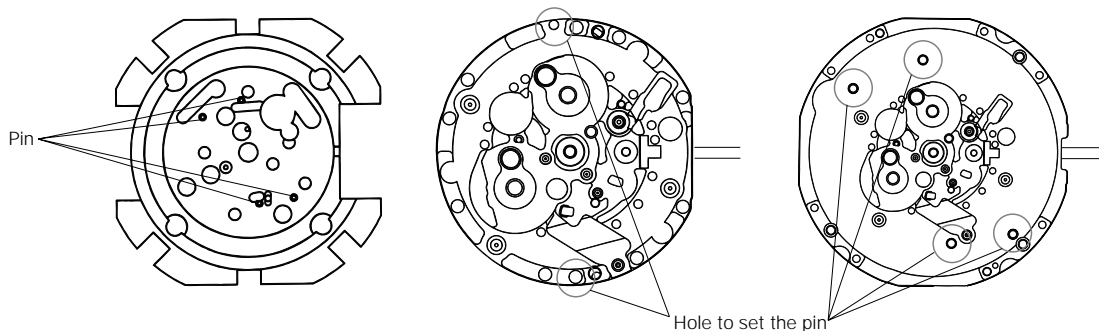
[Movement holder 4F3-T for the dial side of Cal. 4F32A movement]



[Movement holder 8F3-T for the dial side of Cal. 8F32A, 8F33A and 8F35A movements]



[Movement holder 4F8F-C for the case back side of all Cal. 4F and 8F Series movements]



- ② Battery
- ⑤ Insulator for battery (A)

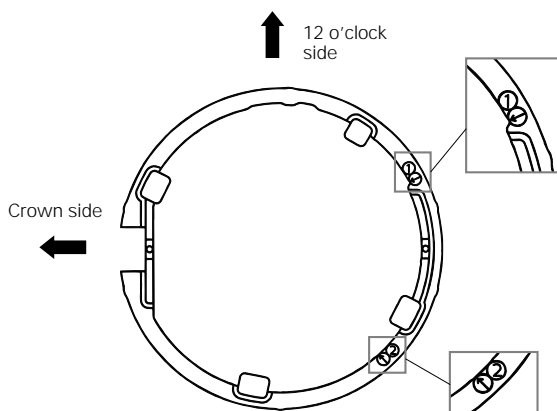
• **How to replace the battery**

- **Be sure to complete the battery replacement work within three minutes. Otherwise, the calendar data stored in the built-in IC will be erased.**
- Before removing the old battery, be sure to keep a new battery at hand.
- When installing the new battery, take utmost care not to short-circuit the battery connection (-) and the circuit block cover, as this will also erase the calendar data.

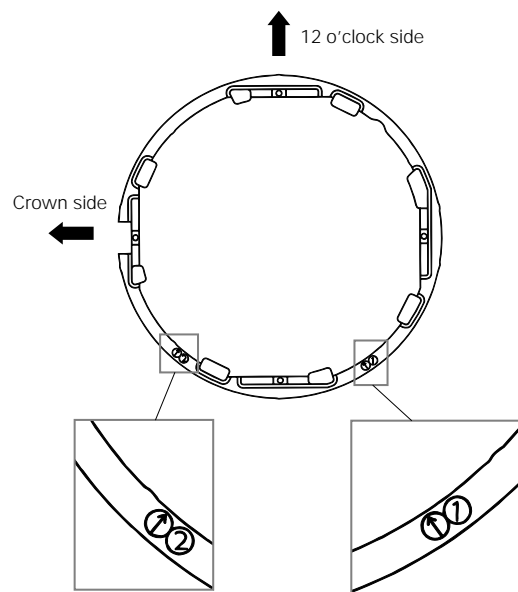
• **How to remove the battery**

The case ring has numerals printed on it to show the order of disengaging the hooking portions of the circuit block cover using the tips of the tweezers.

[Case ring for Cal. 4F32A]



[Case ring for Cal. 8F32A, 8F33A and 8F35A]



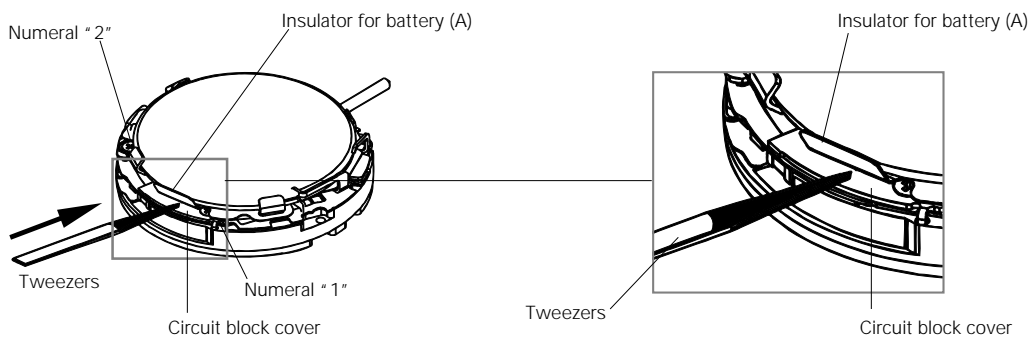
TECHNICAL GUIDE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

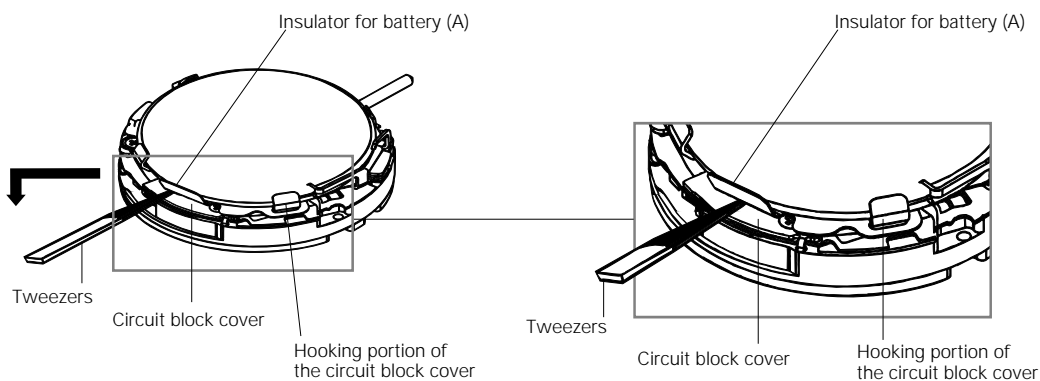
[Cal. 4F32A]

1. Locate the position where numeral "1" is printed on the case ring, and insert the tips of the tweezers into the gap between the insulator for battery (A) and the circuit block cover, while taking care not to damage the coil.

* Take care not to insert the tips of tweezers too deep into the gap as this may damage the coil.



2. Pry with the tweezers to disengage the hooking portion of the circuit block cover.



3. Locate the position where numeral "2" is printed on the case ring, and use the tips of the tweezers in the same manner as in the steps "1" and "2" above and disengage the hooking portion of the circuit block cover to remove the battery.

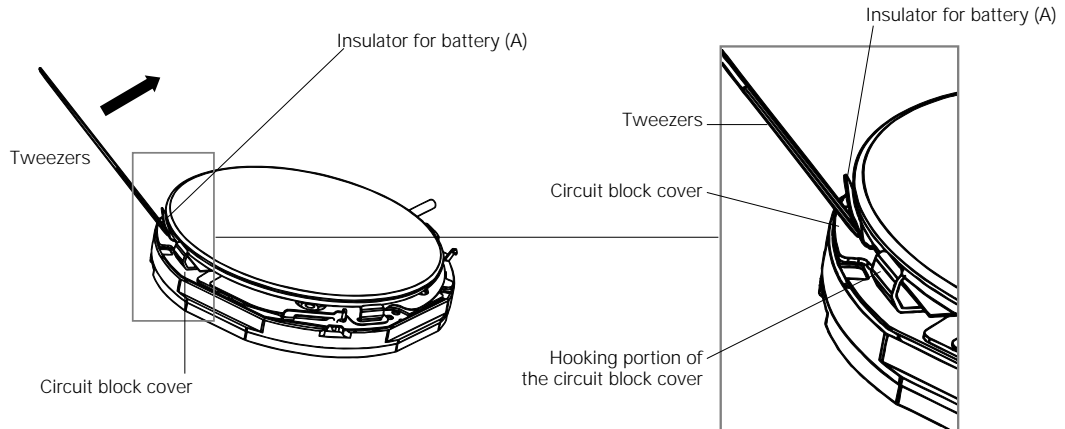
TECHNICAL GUIDE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

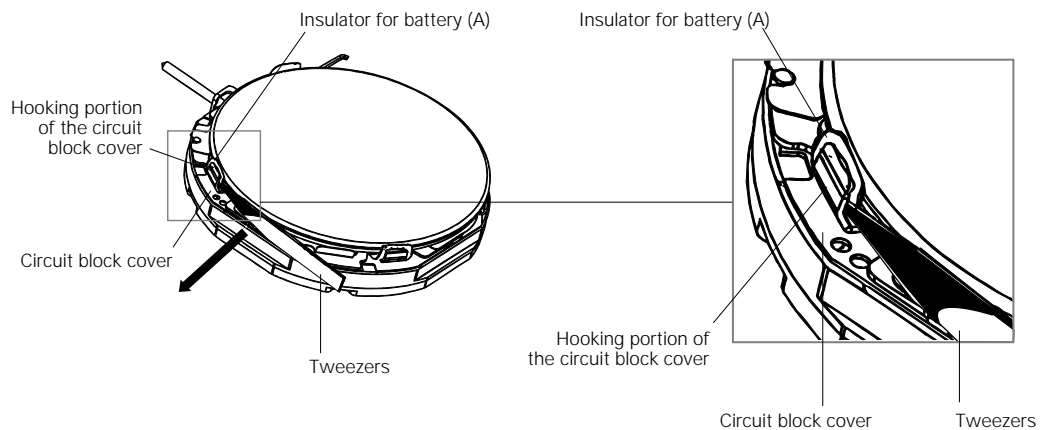
[Cal. 8F32A, 8F33A and 8F35A]

1. Locate the position where numeral "1" is printed on the case ring, and insert the tips of the tweezers into the gap between the insulator for battery (A) and the circuit block cover . Then, pry with tweezers in the direction of the arrow in the illustration below to disengage the hooking portion of the circuit block cover. While doing so, take care not to damage the coil.

* Take care not to insert the tips of tweezers too deep into the gap as this may damage the coil.



2. Locate the position where numeral "2" is printed on the case ring, and insert the tips of the tweezers into the gap between the insulator for battery (A) and the circuit block cover . Then, pry with tweezers in the direction of the arrow in the illustration below to remove the battery.



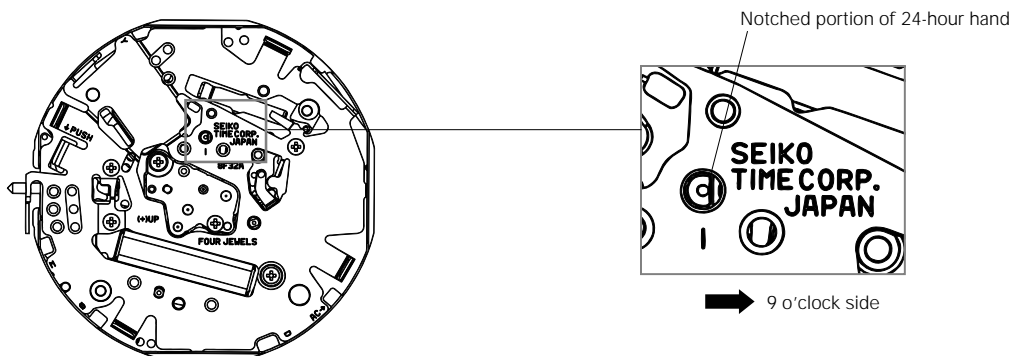
TECHNICAL GUIDE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

- **How to install the battery (For Cal.4F32A, 8F32A, 8F33A and 8F35A)**

[A] When the dial and hands are installed, set the time to 6:00 AM or PM.

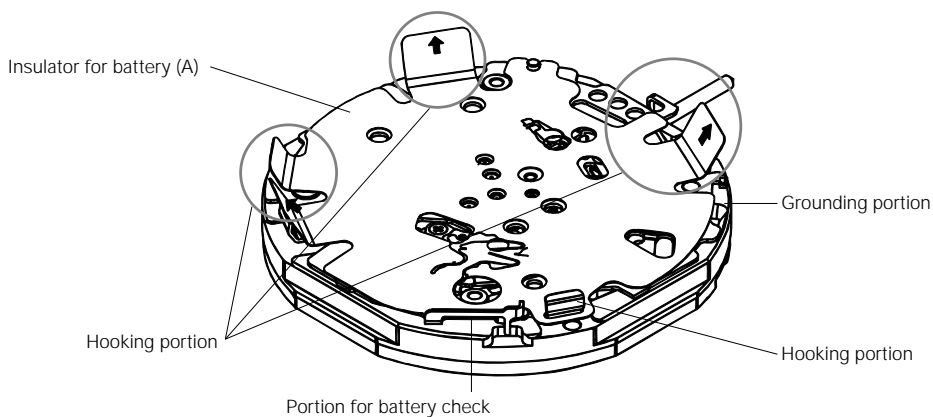
[B] When the dial and hands are not installed, direct the notched portion of the 24-hour hand toward the 9 o'clock side.



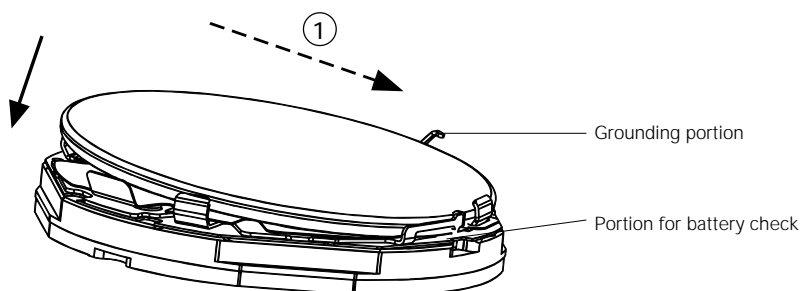
Note: When installing the battery, take care lest the battery connection (-) should touch the four hooking portions of the circuit block cover, the grounding portion and the portion for battery check.

1. Before installing the battery, straighten the three hooking portions of the insulator for battery (A).

Note: Set the insulator for battery (A) securely in position, as it easily gets out of position.



2. First, set a part of the battery into the portion for battery check in the direction indicated by the arrow ①, and then, press it down to install it completely.



• **Necessary procedure after battery change**

1. After the battery is replaced with a new one, be sure to contact the "AC" terminal of the circuit block and the (+) surface of the battery with conductive tweezers for more than three seconds, with the crown at the normal position.
2. Pull out the crown all the way to the second click, and then, push it back in to the normal position. Repeat this procedure twice.

- If the date dial will not turn, and the second hand starts moving at 5-second intervals, the calendar data has been erased.



Input the calendar data following the procedure in "Inputting the calendar data".

- If the date dial returns to the current date, and the second hand starts moving at one-second intervals, the calendar data is securely retained.



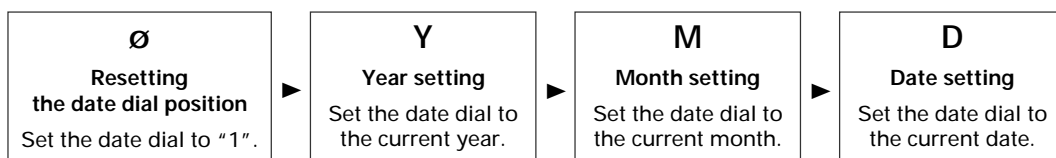
The battery replacement work has been completed successfully. Next, set the time.

• **Inputting the calendar data**

■ **Basic routine of inputting each type of calendar data**

- 1) Contact the (+) surface of the battery and the terminal of the circuit block ("ø", "Y", "M" or "D") with conductive tweezers once to activate the mode of inputting the desired type of data to the watch.
- 2) Contact the (+) surface of the battery and the terminal of the circuit block with tweezers repeatedly to turn the date dial until the desired numeral appears in the calendar frame. Each contact with the tweezers advances the date dial by one. It advances one by one and will not be advanced quickly.

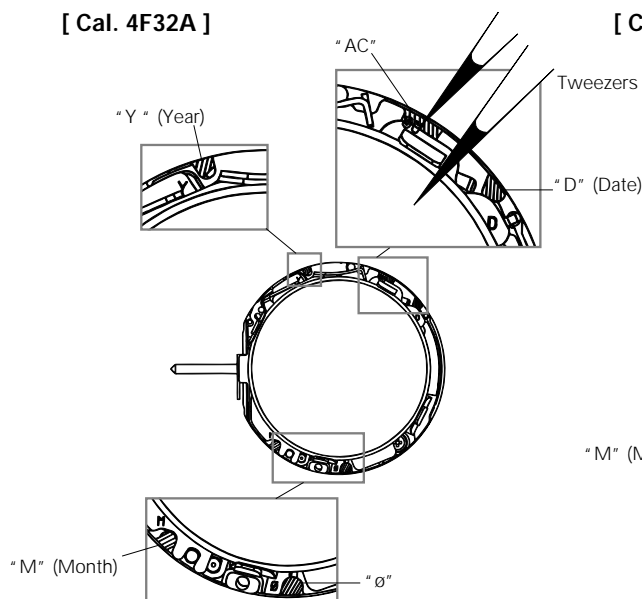
- Input each type of calendar data in the following order:



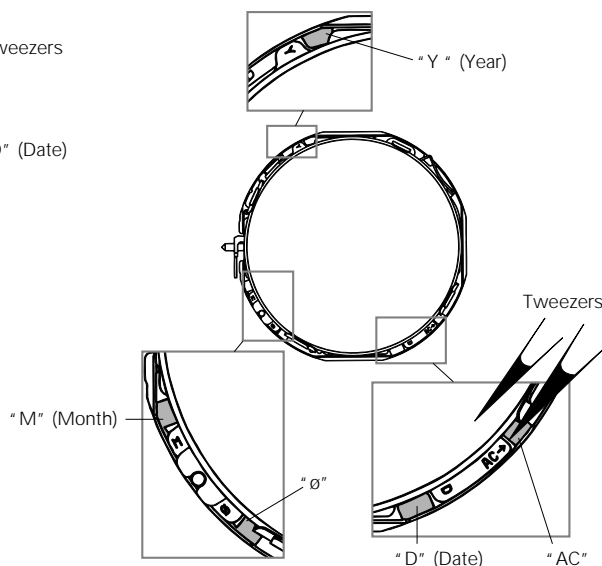
* Be sure to reset the date dial position first.

- Positions of each terminal of the circuit block

[Cal. 4F32A]



[Cal. 8F32A, 8F33A and 8F35A]



■ Procedure of inputting the calendar data

1. Pull out the crown all the way to the second click.

2. Reset the position of the date dial. (ø)

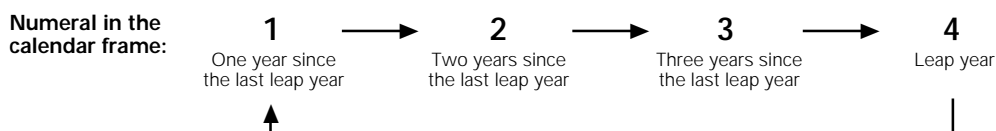
First, contact the "ø" terminal and the (+) surface of the battery with conductive tweezers to activate the date dial resetting mode, and then, contact the two portions repeatedly with tweezers until "1" appears in the calendar frame.

3. Set the year. (Y)

Contact the "Y" terminal and the (+) surface of the battery with conductive tweezers to activate the year setting mode. "1" appears in the calendar frame. Then, contact the two portions repeatedly with tweezers until the current year appears in the calendar frame.

Notes:

- * The date dial turns back when the numeral returns from "4" to "1" in the calendar frame.
- * If any data has already been input before the year setting mode is activated, a numeral other than "1" may appear in the calendar frame.



Numeral in the calendar frame			
1	2	3	4
One year since the last leap year	Two years since the last leap year	Three years since the last leap year	Leap year
Year 1997	1998	1999	2000
2001	2002	2003	2004
2005	2006	2007	2008
2009	2010	2011	2012
·	·	·	·
·	·	·	·
2085	2086	2087	2088
2089	2090	2091	2092
2093	2094	2095	2096
2097	2098	2099	—

4. Set the month. (M)

Contact the "M" terminal and the (+) surface of the battery with conductive tweezers to activate the month setting mode. "1" appears in the calendar frame. Then, contact the two portions repeatedly with tweezers until the current month appears in the calendar frame.

Notes:

- * The date dial turns back when the numeral returns from "12" to "1" in the calendar frame.
- * If any data has already been input before the month setting mode is activated, a numeral other than "1" may appear in the calendar frame.



5. Set the date. (D)

Contact the "D" terminal and the (+) surface of the battery with conductive tweezers to activate the date setting mode. "1" appears in the calendar frame. Then, contact the two portions repeatedly with tweezers until the current date appears in the calendar frame.

Notes:

- * The date dial only advances and will not turn back in the date setting mode.
- * If any data has already been input before the date setting mode is activated, a numeral other than "1" may appear in the calendar frame.

6. Check if the day dial is reset to "1".

Contact the "ø" terminal and the (+) surface of the battery with conductive tweezers once to check that "1" appears in the calendar frame. If not, repeat the procedure again starting from step "2" above.

7. Push back the crown in to the normal position, and check if the number of years since the last leap years, month and date are correctly set. (See "How to check the calendar" below)

● **How to check the calendar**

Pull out the crown to the first click, and push it back in to the normal position within a second.

- * Take care not to pull out the crown all the way to the second click. The calendar cannot be checked.

The calendar will be shown in the frame in the following order.



(1) The second hand moves at 5-second intervals and stops. The number of seconds it has advanced indicates the number of years that have passed since the last leap year. Five seconds correspond to one year.

- * Before pulling out the crown to the first click, check and remember where the second hand is so that you can read how many seconds it has advanced.
- * If the second hand has advanced 20 seconds (four times of five seconds), the current year is the leap year.

Quick movement of the second hand	5 seconds	10 seconds	15 seconds	20 seconds
Number of years since the last leap years	1 year	2 years	3 years	4 years (leap year)

(2) After the second hand indicates the number of years since the last leap year, the numeral in the calendar frame changes to indicate the current month for five seconds.

(3) After the current month is shown, the current date is indicated in the calendar frame.

- * When the month and date are represented by the same numeral as in the case of "January 1st", "February 2nd" and so on, the numeral in the calendar frame quickly advances and moves back by one to indicate that the month and date numerals are identical.

(4) After the current date is shown, the second hand quickly moves to catch up with the current second and starts moving at normal one-second intervals thereafter.

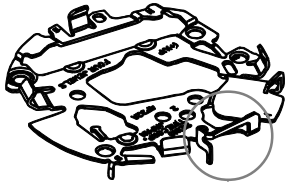
(5) If the calendar is correctly set as you intended, set the desired time.

* If the year, month or date is not correctly set, repeat the procedure of inputting the calendar data starting from step "1".

⑦ Circuit block cover

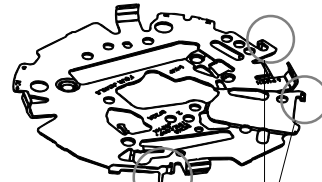
When setting the circuit block cover, take care not to press down the terminal for battery check and the grounding terminal.

[Cal. 4F32A]



Terminal for battery check

[Cal. 8F32A, 8F33A and 8F35A]



Terminal for battery check

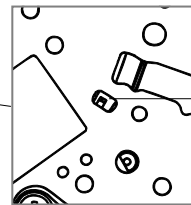
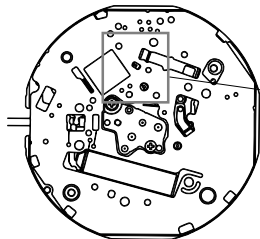
Grounding terminal

⑧ Circuit block

Before replacing the circuit block, make sure that the crown is pulled out to the first click.

Also, check that the tip of the reset lever is positioned at the center of the eyehole as shown in the illustration below, and then, reassemble the circuit block.

Note: When setting the circuit block, take care not to press down on the reset lever.

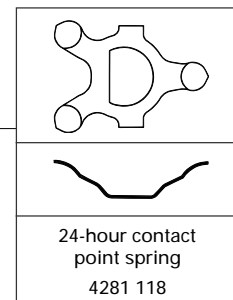
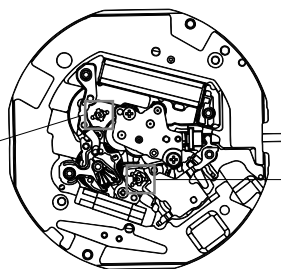
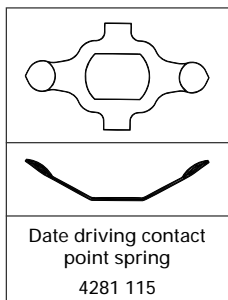


Reset lever terminal

⑨ Date driving contact point spring

⑩ 24-hour contact point spring

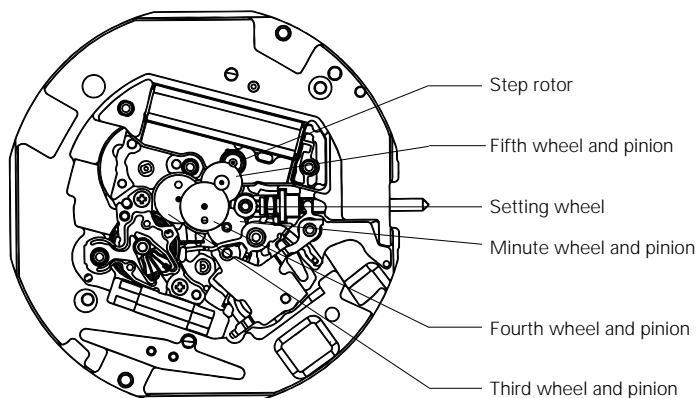
• Setting position



Note: The date driving contact spring and the 24-hour contact point spring contact with the circuit block to drive and control the ultrasonic motor. Handle them with care so as not to bend or straighten these parts, as this will cause defective contact with the circuit block, resulting in a malfunction of the ultrasonic motor and defective calendar indication.

⑮ Train wheel bridge

- **Setting position of wheels**

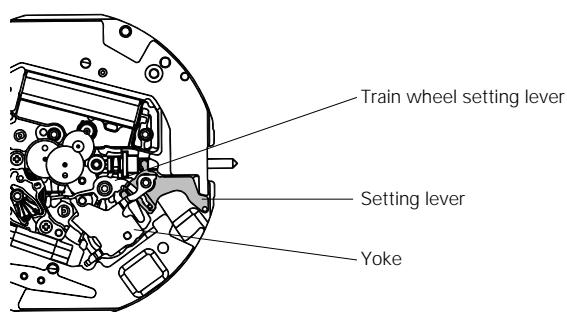


⑳ Train wheel setting lever

㉕ Setting lever

㉖ Yoke

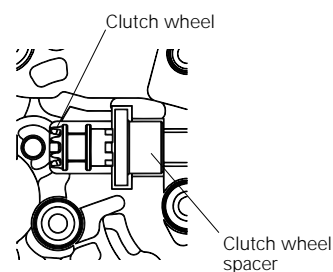
- **Setting position**



Note: Take care not to deform the spring portion of the yoke. While the circuit block cover is removed, do not pull out or push in the crown.

㉘ Clutch wheel

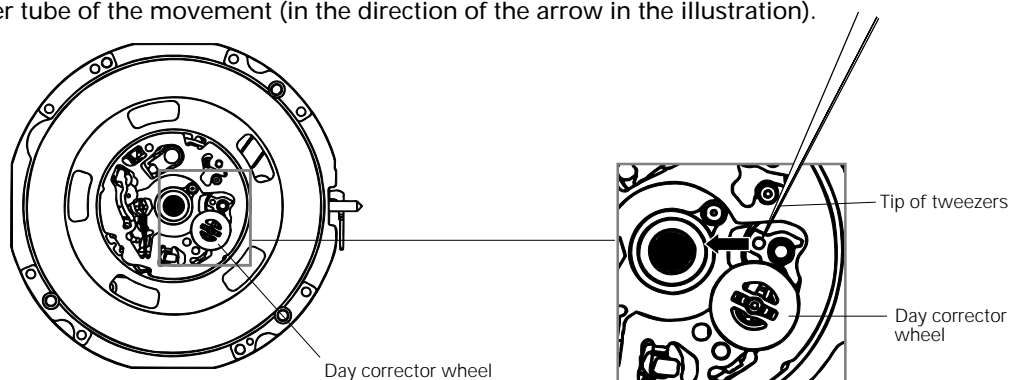
Install the clutch wheel in such a manner that the gear having smaller teeth faces toward the center of the center wheel and pinion.



㉛ Day corrector wheel (For Cal. 8F33A)

- **How to remove**

To remove the day corrector wheel from the second intermediate wheel for calendar corrector, insert a tip of tweezers into the hole of day corrector wheel as shown in the illustration, and move it toward the center tube of the movement (in the direction of the arrow in the illustration).



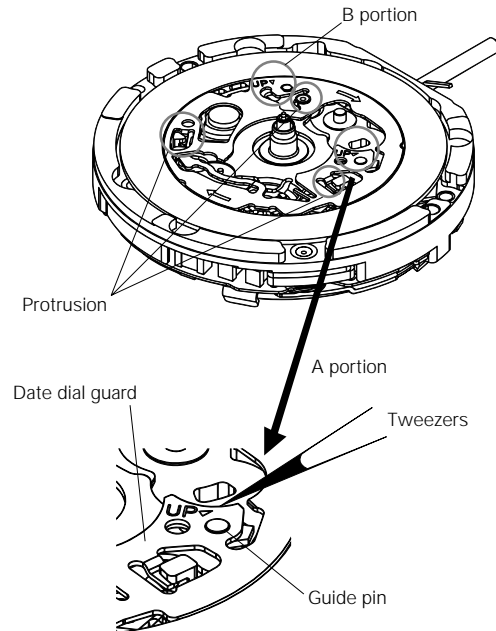
32 Date dial guard

Unlike conventional movements, the date dial guard is not fixed with screws. It is set to the main plate with the three protrusions, which are caught under the main plate by turning the guard. Then, it is fixed by the two guide pins.

• How to remove

1. Lightly lift the A portion of the date dial guard with tweezers to clear it from the guide pin, and then, move it in the clockwise direction until it gets on the guide pin.
2. Release the B portion of the date dial guard in the same manner as you release the A portion, and then, move it in the clockwise direction until it gets on the guide pin.
3. Check that all the three protrusions of the date dial guard have come off from the main plate, and then, remove the date dial guard.

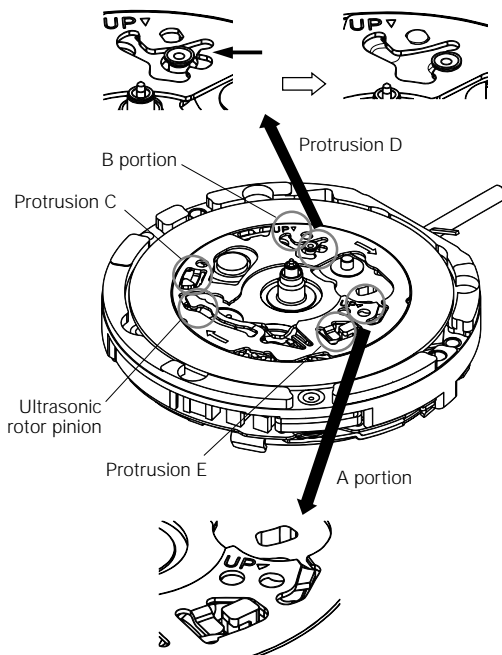
Note: Take care not to deform the date dial guard, as it is softly built.



• How to install

1. Put the date dial guard on the main plate so that the A and B portions are over the guide pins, as shown in the illustrations at right.
2. Move protrusion D of the date dial guard in the counterclockwise direction so that it is caught under the main plate.
3. Slightly move protrusions C and E in the counterclockwise direction alternately to set them under the main plate. While doing so, set the A and B portions of the date dial guard to the guide pins.

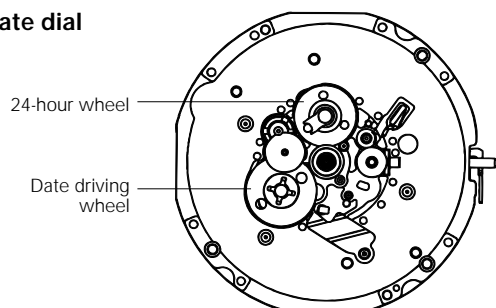
Note: Take care not to press down the ultrasonic rotor pinion while installing the date dial guard.



• How to remove the date dial guard in replacing the date dial (with the parts on the movement side installed)

Be sure to use the movement holder 4F8F-C for exclusive use for replacing the date dial.

Note: Never remove the date driving wheel and the 24-hour wheel. Otherwise, the date driving contact point spring and the 24-hour contact point spring will come off.



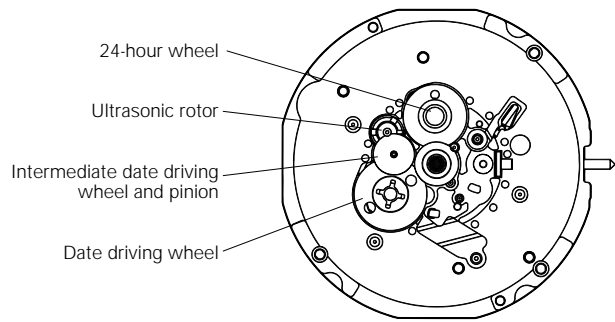
TECHNICAL GUIDE

Cal. 4F32A, 8F32A, 8F33A, 8F35A

- ③⑥ Intermediate date driving wheel and pinion
- ③⑧ Ultrasonic rotor
- ③⑨ 24-hour wheel
- ④⑩ Date driving wheel

• **Setting position**
(For Cal. 4F32A, 8F32A and 8F35A)

Refer to the illustration at right.

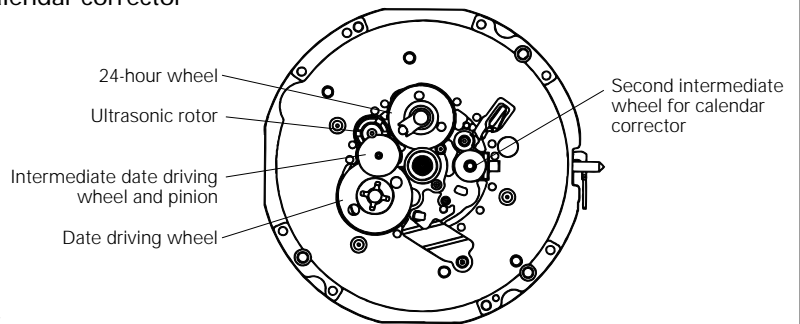


Note: Take care not to damage or deform the pinions of the ultrasonic rotor and date driving wheel in reassembling and disassembling, as they are made of plastic.

- ③⑥ Intermediate date driving wheel and pinion
- ③⑦ Second intermediate wheel for calendar corrector
- ③⑧ Ultrasonic rotor
- ③⑨ 24-hour wheel
- ④⑩ Date driving wheel

• **Setting position**
(For Cal. 8F33A)

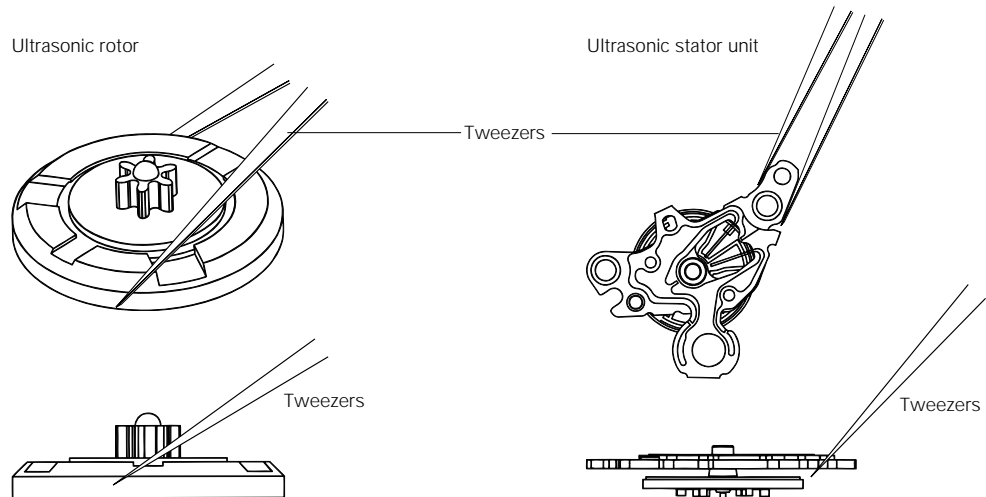
Refer to the illustration at right.



Note: Take care not to damage or deform the pinions of the ultrasonic rotor and date driving wheel in reassembling and disassembling, as they are made of plastic.

- ③⑧ Ultrasonic rotor
- ④② Ultrasonic stator unit

Note: When holding the ultrasonic rotor and ultrasonic stator unit with tweezers, be sure to catch the portions illustrated below. Otherwise, their functions will be adversely affected.



III. VALUE CHECKING

● Coil block resistance

3.6 K Ω ~ 4.0 K Ω

Measuring the coil block resistance

1. Measure the resistance with the coil block installed on the main plate.
2. Apply the red and black probes of the tester to the patterns of the coil lead terminal. While doing so, take care not to touch the end portion of the coil lead terminal, as this will break the coil wire.

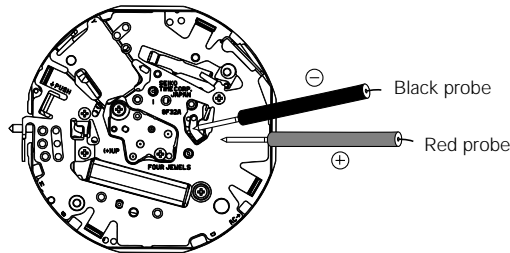
● Current consumption

For the whole movement : Less than 1.3 μ A (with voltage of 3.0 V supplied from a battery)

For the circuit block alone : Less than 0.9 μ A (with voltage of 3.0 V supplied from a battery)

Measuring the current consumption for the whole movement

1. Check that the crown is in the normal (pushed in) position.



2. Apply the red and black probes of the tester to the circuit block cover and the pattern of the (-) terminal of the circuit block, respectively.
3. After connecting the tester, contact the "AC" terminal of the circuit block and the circuit block cover with conductive tweezers. Then, after approximately 20 seconds, start measurement, checking that a stable measurement is obtained.

Measuring the current consumption for the circuit block alone

1. Connect the tester to the input terminals (+) and (-), and contact the "AC" and (+) terminals with conductive tweezers. Then, after approximately 10 seconds, start the measurement, checking that a stable measurement is obtained.

* While measuring current consumption, be sure to protect the circuit block from light with black cloth or the like, as the light may increase the current consumption, resulting in an inaccurate measurement.

Note: When the current consumption for the whole movement exceeds the standard value while the current consumption for the circuit block alone is within the standard value range, a driving pulse may be generated to compensate for the heavy load applied on the gear train, etc. In that case, overhaul and clean the movement parts, and then, measure the current consumption for the whole movement again.

● Time accuracy

- The time accuracy measurement should be made in an environment with the temperature at the range of 23° C ± 2° C and humidity between 50% and 60%.

Normal loss/gain at a normal temperature (23° C) : +0.020 ~ +0.140 sec./day

[A] Check the loss/gain of the watch with the case back closed following the procedure below, and determine the method of adjustment and repair.

Measuring procedure	Measured loss/gain (-/+)	Method of adjustment/repair
① Set the gate of the quartz tester to "10". ② Pull the crown to the second click to stop the second hand. ③ Place the watch on the microphone with its 3 o'clock side up, and read the loss/gain.	Normal : +0.020 ~ +0.140 Defective : -0.012 ~ +0.019 +0.141 ~ +0.204 Defective : -0.013 or smaller +0.205 or greater	➔ Time accuracy adjustment is not necessary. ➔ Adjust the time accuracy. ➔ Replace the circuit block with a new one. ↓ Check the time accuracy. ↓ (Then, adjust the time accuracy.)

Notes:

- * The loss/gain indicated by the tester varies slightly from measurement to measurement. Therefore, make several measurements to get an average loss/gain.
- * When measuring time accuracy, leave the watch untouched for 30 minutes after it is placed on the microphone. Then, start the measurement.

[B] Time accuracy adjustment by pattern cutting

Cut and remove the overhanging pattern with tweezers to adjust the time accuracy.

Notes:

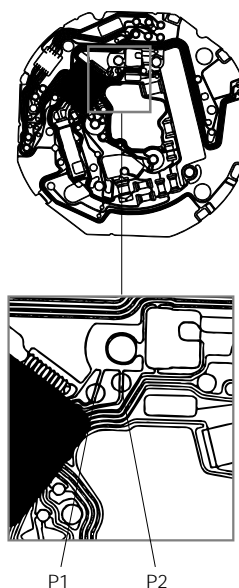
- * After cutting the pattern, check that it is completely detached.
- * Take care not to let the cut pattern get inside the movement.

Pattern cutting combination and adjustment range

By cutting one or both of the patterns P1 and P2, the loss/gain of the watch can be adjusted by an amount between -0.064 and +0.032 sec./day.

Pattern		Amount of loss/gain from base accuracy
P2	P1	
×	○	-0.064
○	×	-0.032
×	×	+0.032

× : Cut
○ : Connected



Note: Once the patterns are cut off, reconnecting them by soldering may not adjust the loss/gain by the amount specified in the table above and may also change the temperature characteristics of the watch. Adjust the loss/gain, therefore, only by cutting the patterns.

[C] Example of the time accuracy adjustment

- Step 1** Measure the loss/gain of the watch with the case back closed.
Obtained loss/gain: +0.180 sec./day
- Step 2** Find the amount of deviation from the allowable range of loss/gain between +0.020 and +0.140 sec./day.
Deviation from the allowable accuracy: $+0.180 - (+0.140) = +0.040$ sec./day
- Step 3** Remove the circuit block and adjust the accuracy.
Find a value of loss/gain from the table above that can offset the deviation obtained in Step 2 and bring the loss/gain within the allowable range. In this example, -0.064 sec./day is adequate, so cut the pattern P2.
- Step 4** Install the circuit block you have adjusted to the movement, and measure the loss/gain of the watch with the case back closed to check if the obtained loss/gain is within the allowable range between +0.020 and +0.140 sec./day.

[D] Remarks on measuring the time accuracy

- Measure the loss/gain at a temperature range of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ with humidity between 50% and 60%.
- If you hold the watch in your hand for a long time before measuring the accuracy, the temperature of the watch itself will rise and a stable measurement may not be obtained even in the environment specified above. In that case, leave the watch untouched in the above environment for a sufficient period of time, and then, start the measurement.
- Use a quartz tester QT-2100 that can measure a loss/gain up to 0.001 sec./day.

■ Tips on repairing

The following are the troubleshooting guide for the problems particular to Cal. 4F32A, 8F32A, 8F33A and 8F35A.

Problem	Possible cause	Remedies
The date dial will not move or the date does not change properly.	1) Wrong calendar data was input. 2) Defects in the ultrasonic motor 3) Defects in the circuit block and contact point springs	1) Newly input the calendar data. 2) Check the wheels around the ultrasonic motor. 3) Replace the circuit block, 24-hour contact point spring and date driving contact point spring all in a set.