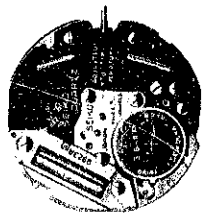
SEIKO

QUARTZ

Cal. 9923A

PARTS LIST

Cal. 9923A




122 731


131 731


221 781

225 788


231 781


241 788


261 781


271 788

281 589

282 782

354 781


383 780


384 781


386 782

390 780


391 731


☆397 781


☆470 785


701 781

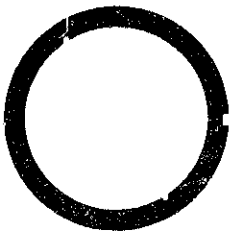

☆801 785


802 781


808 781


810 781

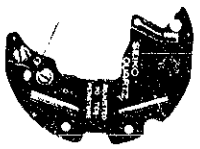

868 781


☆884 991


962 781


963 781


981 781

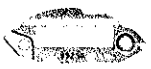

4001 733


4002 731

4146 731


4219 731


4242 780


4259 737


☆Maxell
SR926SW


022 468


022 491

022 754


022 764

2/1

☆⇨Please see remarks on the next reverse page.

Cal. 9923A

Characteristics

Casing diameter : ϕ 25.6 mm
Maximum height : 3.7 mm without battery
Jewels : 5 j
Frequency of quartz crystal oscillator : 32,768 Hz (Hz = Hertz . . . . Cycles per second)
Driving system : Step motor system (2 poles)
Regulation system : Trimmer condenser
Second setting device
Calendar (Day & Date)
Instant setting device for day & date calendar
Bilingual change-over system for day of the week
Battery life indicator : Second hand moves in two-second interval

PART NO.	PART NAME
122 731	Center wheel bridge
131 731	Third wheel bridge
221 781	Center wheel & pinion
225 788	Cannon pinion
231 781	Third wheel & pinion
241 788	Fourth wheel & pinion
261 781	Minute wheel
271 788	Hour wheel
281 589	Setting wheel
282 782	Clutch wheel
354 781	Winding stem
383 780	Setting lever
384 781	Yoke (Clutch lever)
386 782	Setting lever spring
390 780	Setting lever axle
391 731	Second setting lever
☆397 780	Lever for unlocking stem
☆**397 781**	
☆397 782	
☆**470 785**	Day star with dial disk
701 781	Fifth wheel & pinion
☆**801 785**	Date dial
802 781	Date driving wheel
808 781	Date dial guard
810 781	Date jumper
868 781	Day finger
☆884 553	Holding ring for dial
☆**884 991**	
☆884 992	
☆884 993	
962 781	Intermediate wheel for calendar correction
963 781	Snap for day star with dial disk
981 781	Day-date corrector wheel rocker
4001 733	Circuit block
4002 731	Coil block
4146 731	Step rotor
4219 731	Insulator for battery connection
4242 780	Plus terminal of battery connection
4259 737	Anti-magnetic shield plate
011 324	Upper hole jewel for fifth wheel
011 324	Lower hole jewel for fifth wheel
011 404	Upper hole jewel for fourth wheel
011 537	Upper hole jewel for step rotor
011 537	Lower hole jewel for step rotor
022 468	Center wheel bridge screw
022 468	Third wheel bridge screw

PART NO.	PART NAME
022 468	Anti-magnetic shield plate screw
022 468	Circuit block screw
022 491	Setting lever spring screw
022 491	Day finger screw
022 491	Date jumper screw A
022 754	Date jumper screw B
022 754	Date dial guard screw
022 764	Dial screw
023 086	Tube for center wheel bridge screw
023 087	Tube for third wheel bridge screw A
023 091	Day finger pin
023 092	Day-date corrector wheel rocker pin
023 359	Guide pin for setting lever spring
023 365	Date jumper pin
023 399	Second-setting lever pin
023 741	Upper bush for center wheel
023 744	Upper bush for third wheel
023 744	Lower bush for third wheel
023 902	Pin for second-setting lever spring
027 002	Tube for third wheel bridge screw C
027 011	Tube for circuit block A
027 012	Tube for circuit block B
027 013	Tube for circuit block C
027 492	Pin for plus terminal of battery connection
027 824	Yoke pin
☆SEIKO SB-AP	Silver oxide battery
☆Maxell SR926SW	

☆ ⇨ Please see remarks on the reverse page.
Part numbers in light letters are not shown in photos.

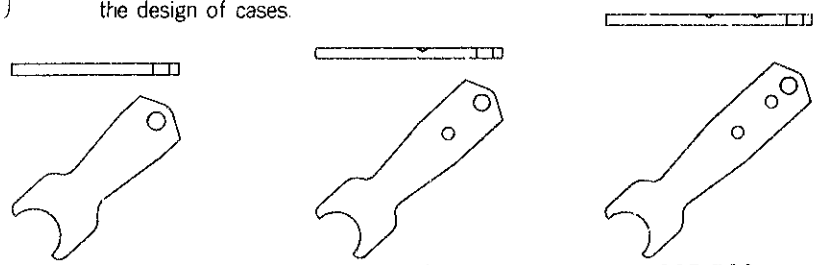
Cal. 9923A

Remarks :

Lever for unlocking stem

☆397 780 (Long)
☆397 781 (Middle) ·····The size of a lever for unlocking stem is determined based on the design of cases.
☆397 782 (Short)

There are three types of lever for unlocking stem.



☆397 782 ☆397 781 ☆397 780

If the combination of the lever for unlocking stem and case is unkown, check the case number and refer to the **"SEIKO Quartz Casing Parts List"** to choose an appropriate lever for unlocking stem.

Day star with dial disk

☆470 785 (English↔Spanish, black figures on white background)
Used when both the crown and the calendar frame are located at **3** o'clock position. If any other type of day star with dial disk is required, specify the number printed on the disk.

Date Dial

☆801 785·····Used when both the crown and the calendar frame are located at **3** o'clock position.

If any other type of date dial is required, specify ① Cal. No. ② The crown position ③ The calendar frame position ④ Dial No. and ⑤ Date Color of date dial.

Holding ring for dial

☆884 553·····Used for bayonet type case back with round dial.
☆884 991·····Used for both the watch of one-piece type case and the watch of round dial that the movement is fixed in the case back.
☆884 992·····Used for the snape-type case back with round dial.
☆884 993·····Used for the case with square dial.
The type of holding ring for dial is determined based on the design of cases and dials. Check the case number and refer to **"SEIKO Quartz Casing Parts List"** to choose an appropriate holding ring for dial.

Battery

☆SEIKO SB-AP
☆Maxell SR926SW ····· The applied battery for this calibre might be added the substitutive in the future. In that case, please refer to separate **"BATTERIES FOR SEIKO QUARTZ WATCHES"**.

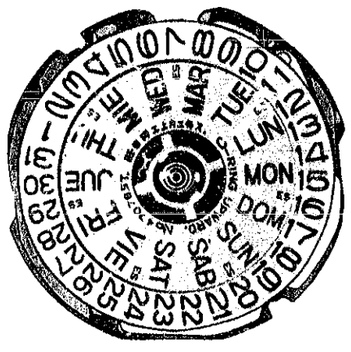
79. 9 Printed in Japan

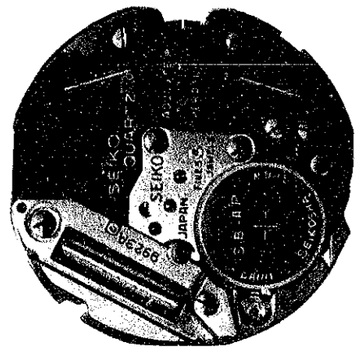
TECHNICAL GUIDE

SEIKO

QUARTZ

CAL. 9923A

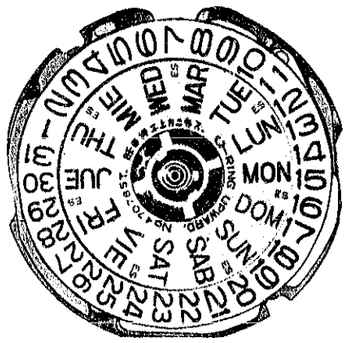


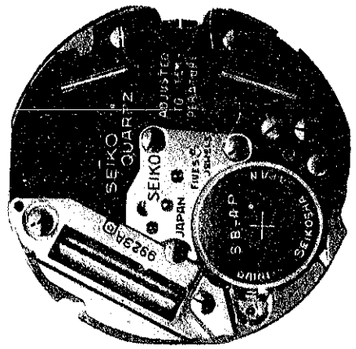


CONTENTS

Quartz Crystal Oscillator Watch SEIKO Twin Quartz Cal. 9923A

SEIKO Twin Quartz Cal. 9923A with two crystal oscillators is a high accuracy quartz watch whose annual time loss or gain has been reduced to approximately 20 seconds.





I. SPECIFICATIONS AND FEATURES

1. Specifications

Item \ Cal. No.	9923A
Indicating system	3-hand time indication (hour, minute and second)
Additional mechanism	Calendar (day & date) Bilingual changeover system for day of the week Instant day and date setting Electronic circuit-reset switch Second setting device (stops at every second) Battery life indicator
Crystal oscillator	32,768 Hz (Hz = Hertz . . . . . Cycles per second) (Two crystal oscillators are used.)
Loss/gain	When the watch is worn on the wrist for 8 hours or more per day at normal temperatures (5°C to 35°C), the annual loss/gain is approx. ± 20 seconds. However, up to 4 seconds of loss/gain per month may be caused depending on the wearing conditions.
Outside diameter	ϕ 26.0mm
Casing diameter	ϕ 25.6 mm
Height	3.7 mm without battery
Operational temperature range	-10°C ~ +60°C (14°F ~ 140°F)
Driving system	Step motor system (2 poles)
Regulation system	Trimmer condenser
Battery power	Silver oxide battery SEIKO SB-AP or Maxell SR926SW Battery life is approximately 3 years. Voltage: 1.55V
Jewels	5 jewels

2. Features

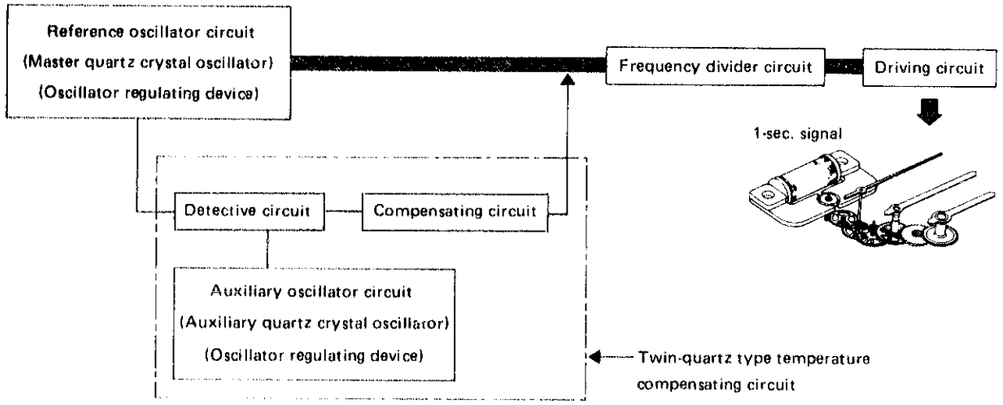
(1) A pair of crystal oscillators having different temperature characteristics are used in the circuit block. Each crystal oscillator is oscillated independently and detects temperature change, which is compensated through the micro computer. The influence of temperature change on the time accuracy is thus reduced to the minimum and extra-high accuracy is achieved.

(2) Although Cal. 9923A is adopting the instant day and date setting and equipped with the battery life indicator, they are neat in design because of the ultra thin movement.

3. Principle of high accuracy

(1) Operating principles

Cal. 9923A is an extra-high precision watch which is equipped with a twin-quartz type temperature compensating circuit, in addition to the oscillator circuit, frequency dividing circuit and driving circuit usually found on other analogue quartz watches.



(2) Temperature compensating circuit

1) Arrangement

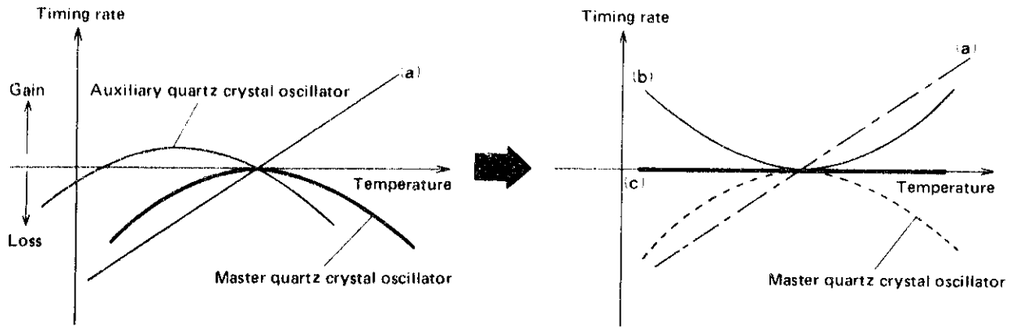
The temperature compensating circuit consists of the following components.

A. Compensating oscillator circuit equipped with an auxiliary quartz crystal oscillator and an oscillator regulating device.

B. Detective circuit which computes the watch temperature according to the difference in oscillating frequency between the master and the auxiliary quartz crystal oscillators.

C. Compensating circuit which corrects the timing rate according to the detected temperature.

2) Method of temperature compensation



Step 1. The difference in oscillating frequency between the master and the auxiliary quartz crystal oscillators is computed .... Line (a)

Step 2. The straight line (a) obtained by computation in step 1 is squared and compensated through a microprocessor in the circuit .... Curve (b)

Step 3. The sum of the curve (b) and the characteristic curve for the master quartz crystal oscillator is computed to form a straight line (signal) which is not affected by temperature change.

II. DISASSEMBLING, REASSEMBLING AND LUBRICATING

1. Disassembling, Reassembling and Lubricating

- **Disassembling and reassembling**
  Disassembling procedures Figs.: ① ~ ㊺
  Reassembling procedures Figs. : ㊺ ~ ①

- **Lubricating**
  The following marks in the diagrams for disassembling and reassembling indicate the types and quantities of oil to be applied and the lubricating portions. Be sure to lubricate according to the marks.

Type of oil	Oil quantity
Moebius A	Normal quantity
SEIKO watch oil S-6	Extremely small quantity
⊗ Never lubricate the portions marked ⊗	

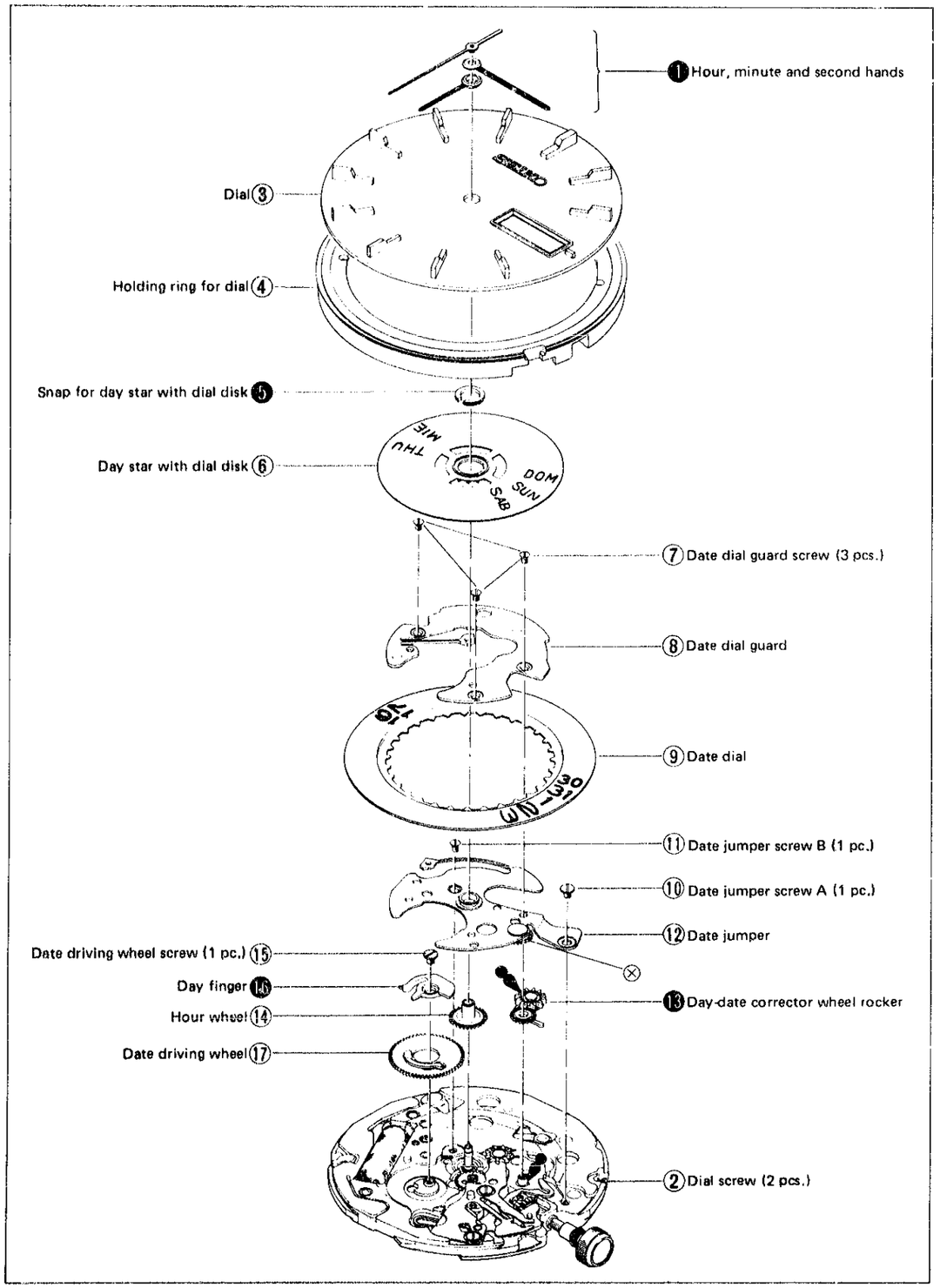
- **Movement holder**
  Use the movement holder S-651 when disassembling and reassembling.

List of screws used

The four types of screws used in Cal. 9923A are listed below.

Shape	Parts No.	Name	Shape	Parts No.	Name
	022 764	Dial screw (2 pcs.)		022 491	Day finger screw (1 pc.) Setting lever spring screw (2 pcs.) Date jumper screw A (1 pc.)
	022 468	Circuit block screw (3 pcs.) Center wheel bridge screw (1 pc.) Third wheel bridge screw (3 pcs.) Anti-magnetic shield plate screw (2 pcs.)		022 754	Date dial guard screw (3 pcs.) Date jumper screw B (1 pc.)

(1) Disassembling, reassembling and lubricating of the calendar mechanism



❶ Hour, minute and second hands

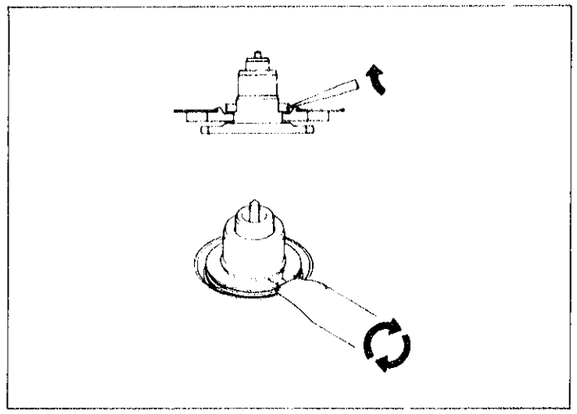
Remarks for disassembling and reassembling

- Pull the crown out to the second click for disassembling and reassembling.
- Be sure to reassemble the second hand correctly over the second mark. (Both odd and even second marks will do.)
- When reassembling, be careful that the hands do not touch each other as the watch is so thin that the clearance between the hands is less than that for ordinary type watches. Also be careful that the glass, hands and dial do not touch each other.

❺ Snap for day star with dial disk

Remarks for disassembling

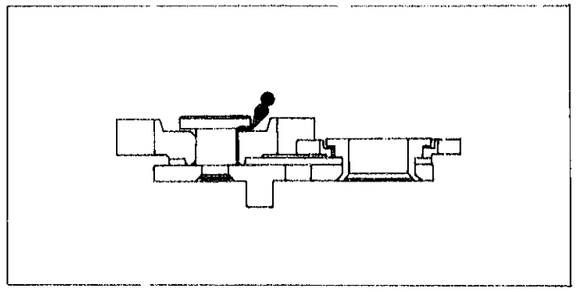
Put the tip of a screwdriver into the groove of the snap for day star with dial disk, and pry it open in the arrow-marked direction.



⓭ Day-date corrector wheel rocker

Remarks for reassembling

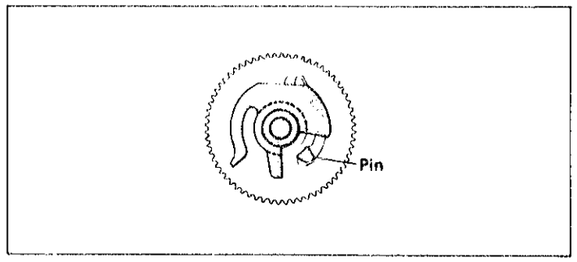
- Lubricate the day-date corrector wheel rocker as shown in the illustration on the right.
- Pull out the crown to the first click position and reassemble the day-date corrector wheel rocker.



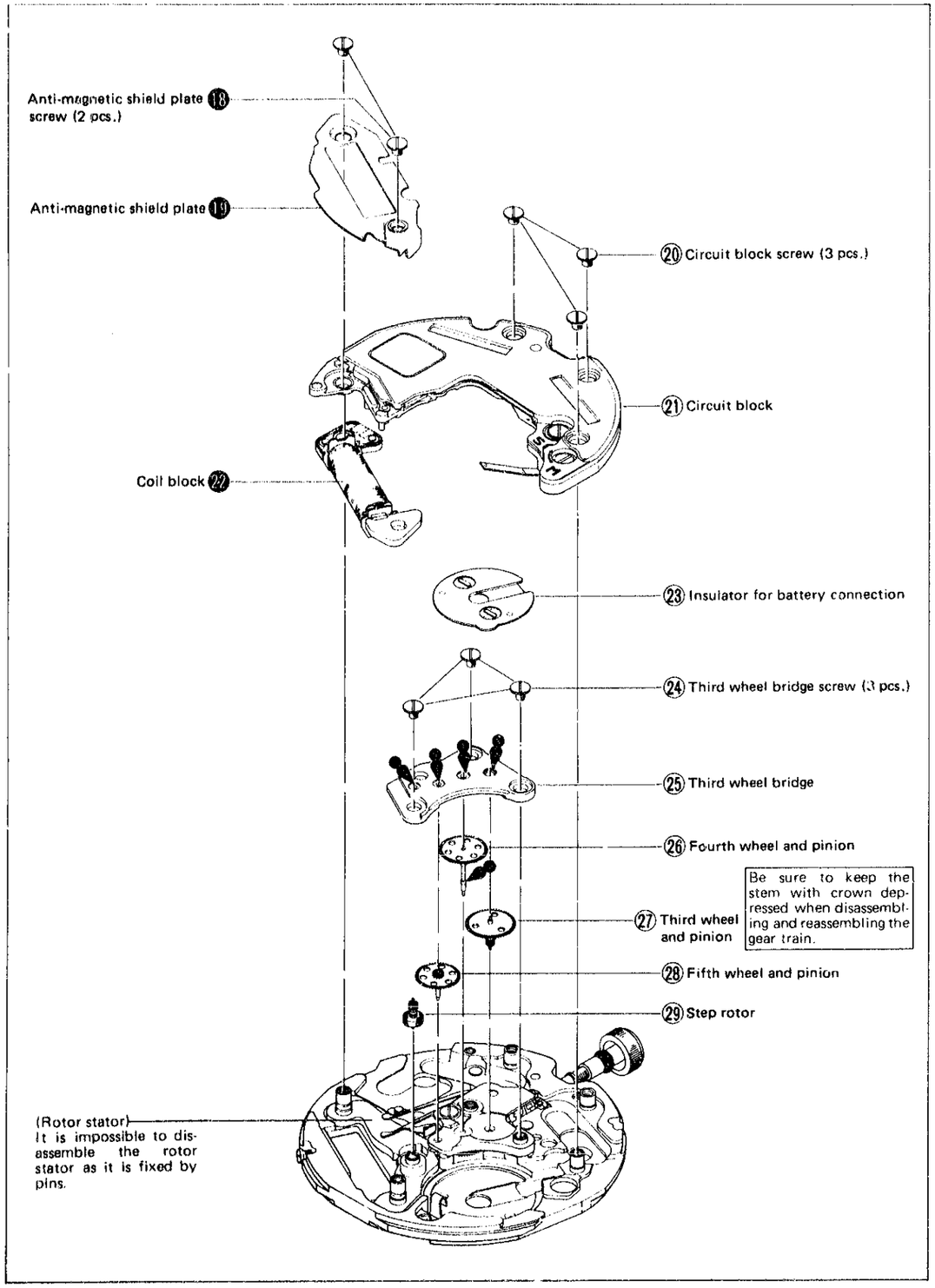
❻ Day finger

Remarks for reassembling

- Reassemble the day finger so that the date driving wheel pin is positioned as shown in the illustration on the right.



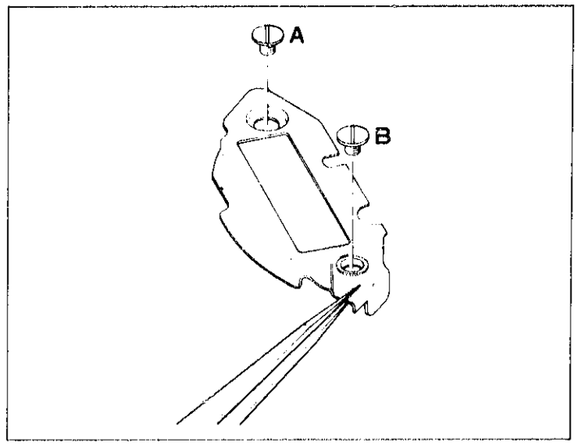
(2) Disassembling, reassembling and lubricating of the circuit block, coil block and gear train



⓳ Anti-magnetic shield plate

Remarks for disassembling and reassembling

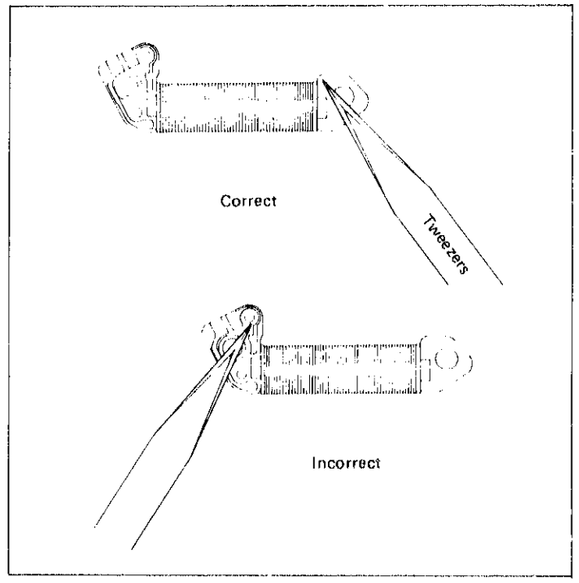
- Disassemble by holding with tweezers as shown in the illustration on the right.
- Be careful in handling as the anti-magnetic shield plate is easy to bend.
- Be sure to tighten the anti-magnetic shield plate screw A first and then B next. (If B is tightened first, it will be difficult to tighten A as A portion of the anti-magnetic shield plate lifts up.)



㉒ Coil block

Remarks for disassembling and reassembling

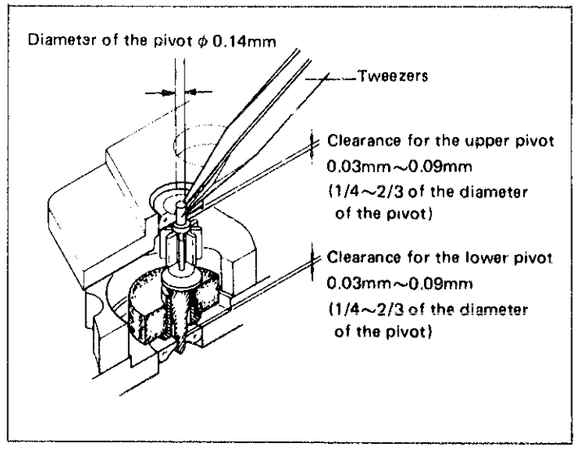
- Be careful not to damage the coil wire and the lead terminal. Handle it as shown in the illustration below.



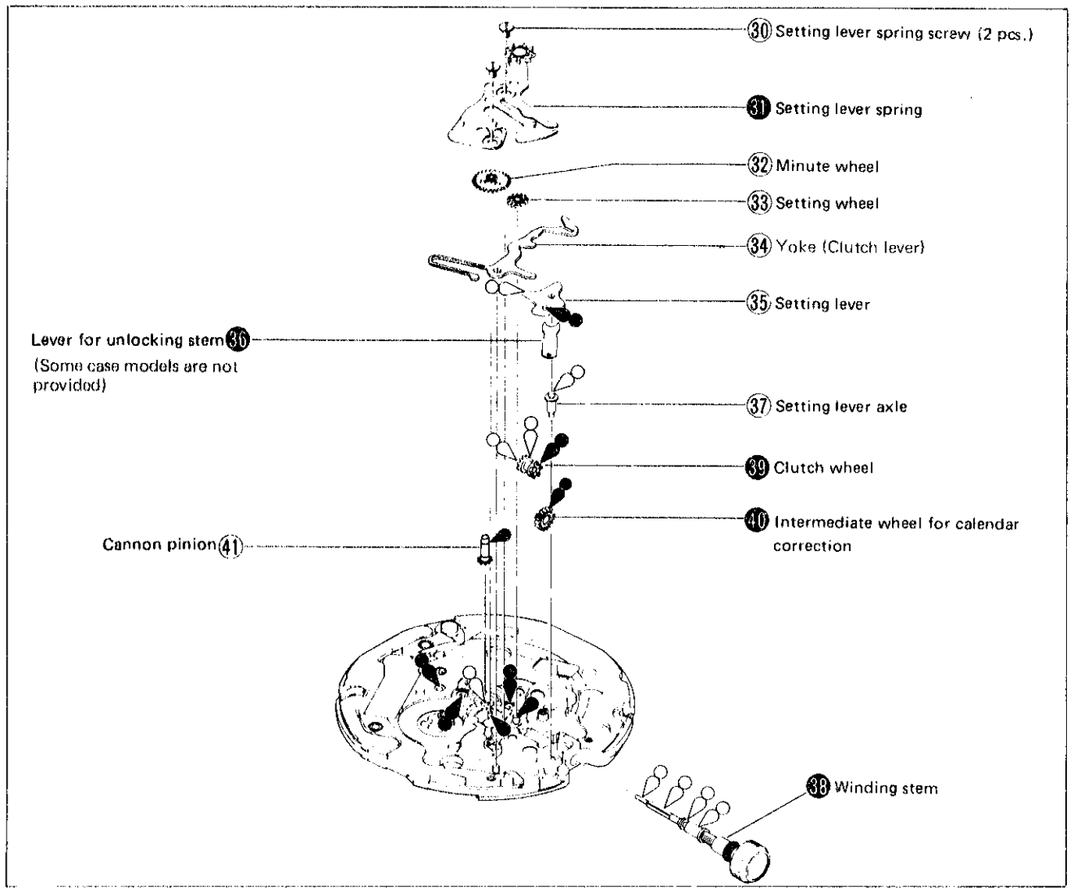
⓲ Anti-magnetic shield plate screw (2 pcs.)

Remarks for reassembling

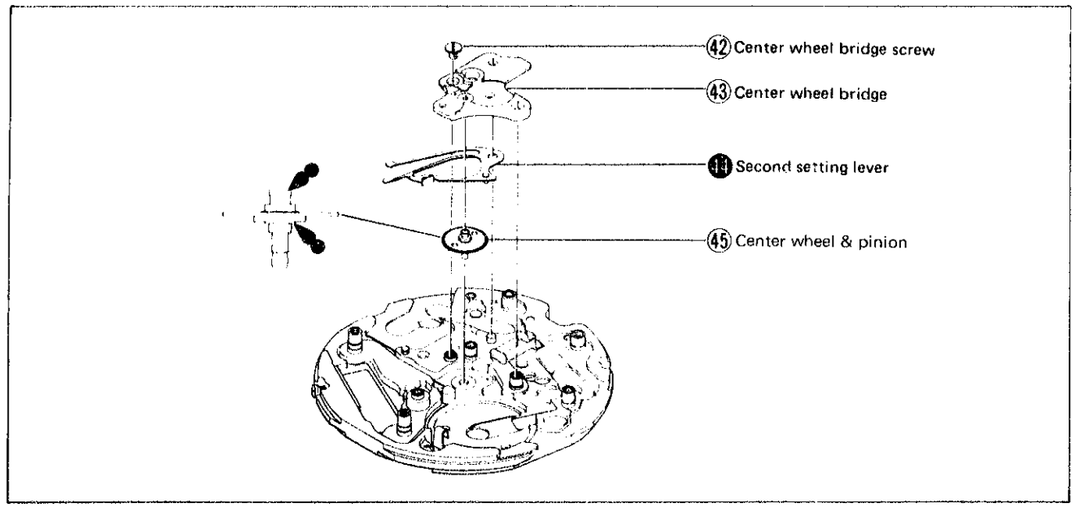
- Check the clearances for the upper and the lower pivots for the step rotor after tightening the anti-magnetic shield plate screws.
- Check the clearance for the lower pivot by depressing the upper pivot by tweezers.
- Check the clearance for the upper pivot by depressing the lower pivot by tweezers.
- Check the clearances by using the diameter of the pivot as a guide.



(3) Disassembling, reassembling and lubricating of the setting mechanism



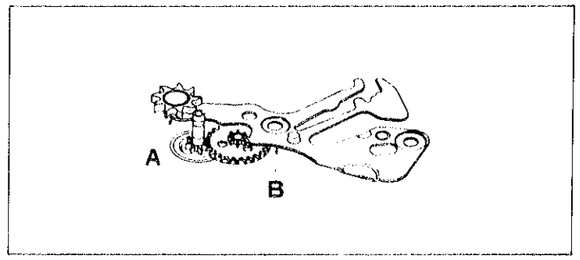
(4) Disassembling, reassembling and lubricating of the center wheel bridge ~ the center wheel and pinion



(31) Setting lever spring

Remarks for disassembling

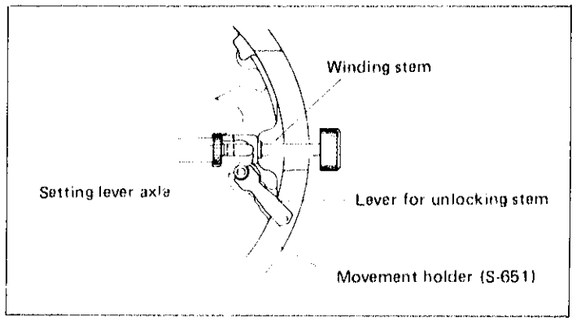
- Pry up the arrow-marked portion A slightly and remove the arrow-marked pin B (positioned under the setting lever spring).
  Then pry up the setting lever spring for disassembling by holding the portion A.



(36) Lever for unlocking stem

Remarks for reassembling

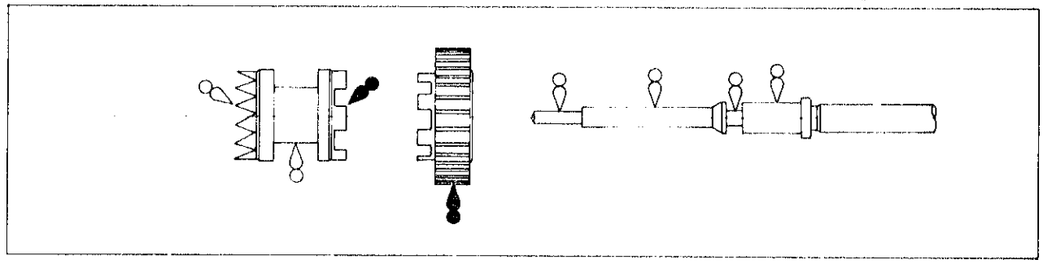
Use the circumference of the movement holder as shown in the illustration on the right to surely reassemble the lever for unlocking stem.



(38) Winding stem
(39) Clutch wheel
(40) Intermediate wheel for calendar correction

Remarks for reassembling

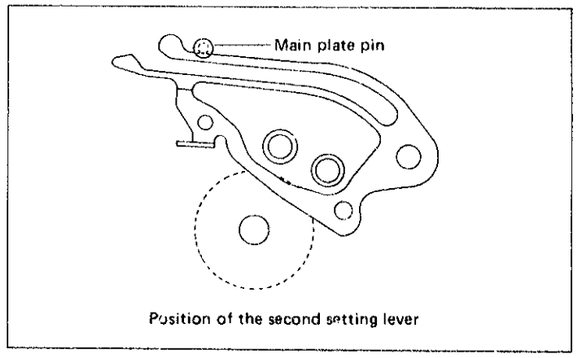
- Reassemble after reassembling the center wheel bridge. (It is difficult to reassemble the clutch wheel and the intermediate wheel for calendar correction if the center wheel bridge is not reassembled.)
- Refer to the illustration below for the direction of reassembling and the lubricating.



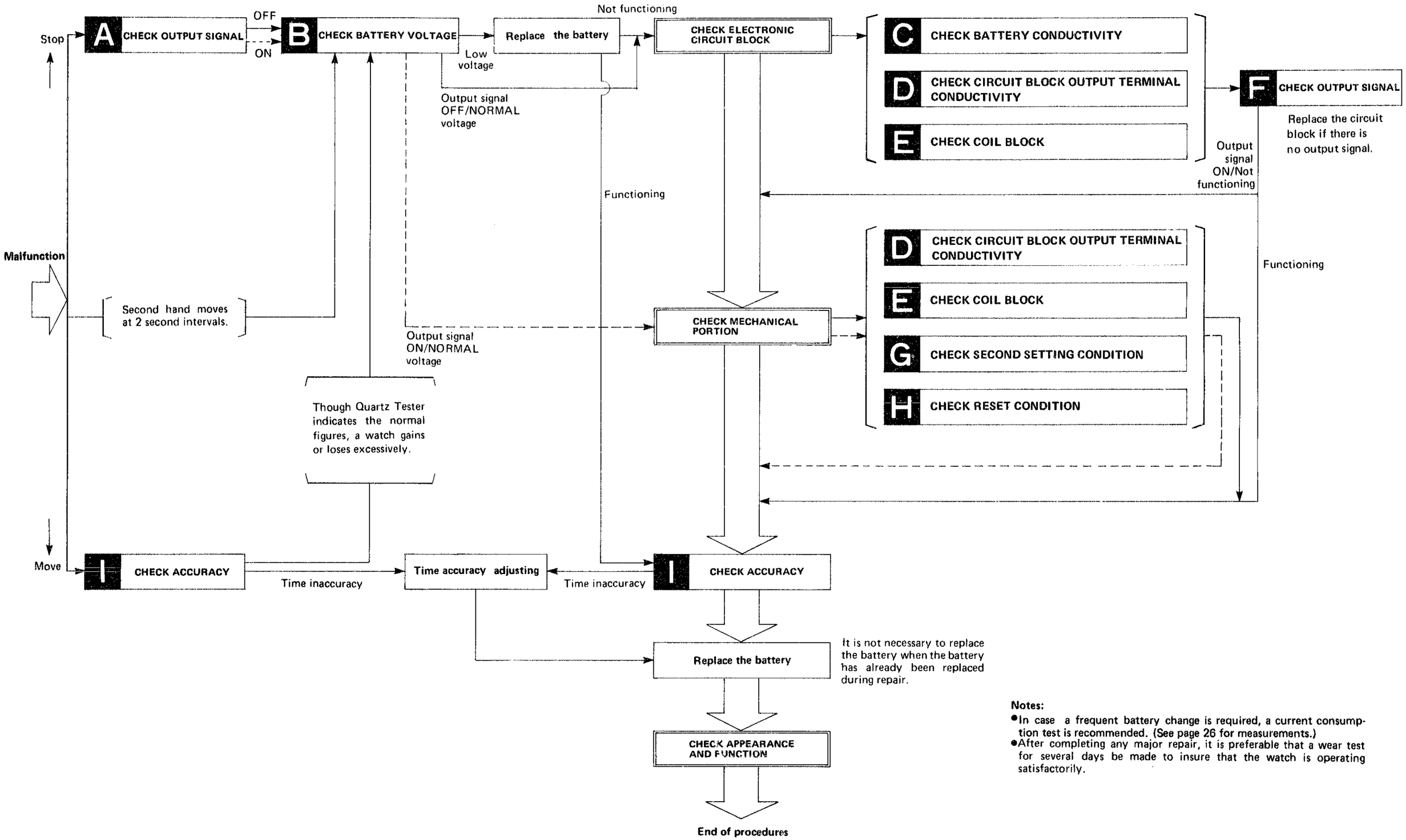
(44) Second setting lever

Remarks for reassembling

- Hook the spring portion to the main plate pin as shown in the illustration on the right.
- Be sure to pull out the winding stem completely and then reassemble the second setting lever when the setting mechanism is already reassembled.



1. Guide table for checking and adjustment



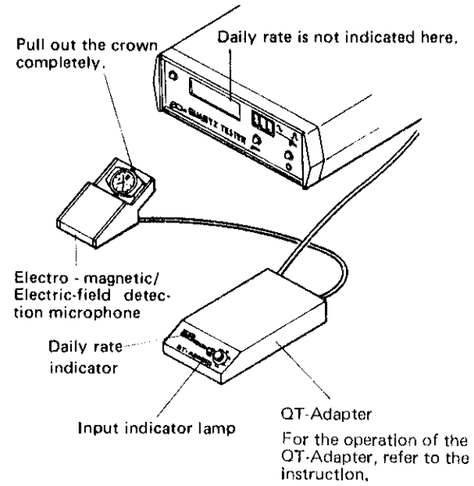
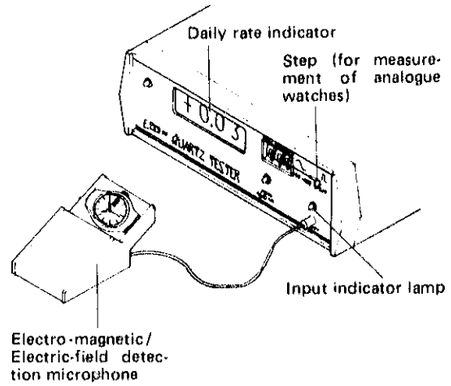
Notes:

- In case a frequent battery change is required, a current consumption test is recommended. (See page 26 for measurements.)
- After completing any major repair, it is preferable that a wear test for several days be made to insure that the watch is operating satisfactorily.

How to check time accuracy of Cal. 9923A

(For time accuracy adjusting, refer to page 23.)

1. Difference in measurement between Cal. 9923A and the existing analogue quartz watches

Cal. 9923A	Existing analogue quartz watches
 **Note:** When the Quartz Tester QT-99 is used, the QT-Adapter is not necessary.	

2. Remarks for measuring Cal. 9923A

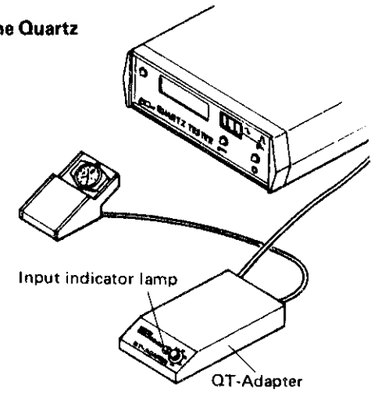
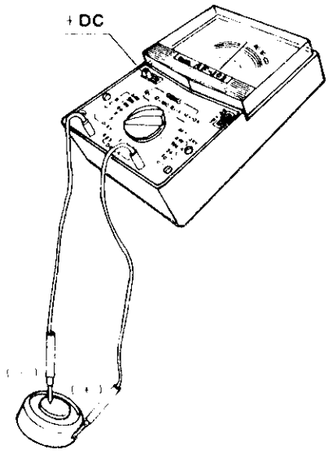
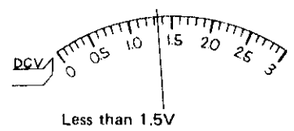
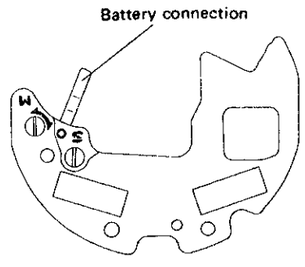
(1) Use the QT-Adapter or Quartz Tester QT-99.
Cal. 9923A employs a pair of quartz crystal oscillators to produce an extra-high timing accuracy that hampers the measuring efforts in an ordinary way using the conventional timing instruments. Therefore, in measuring its accuracy, the detection and computation of the signals from twin quartz crystal oscillators are needed.

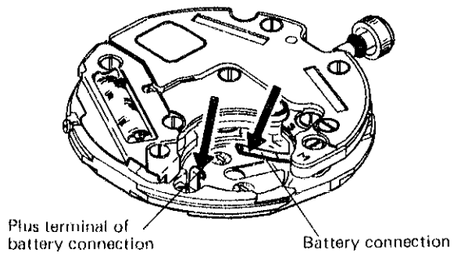
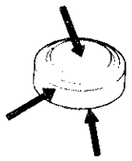
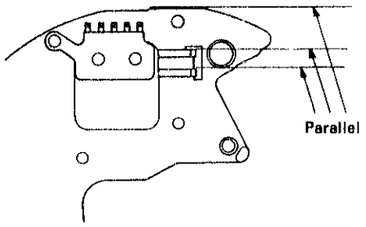
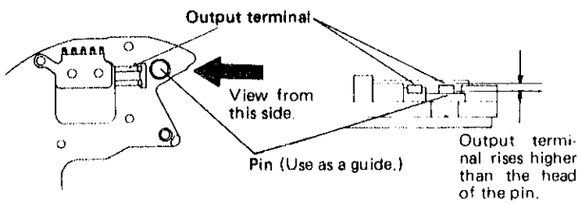
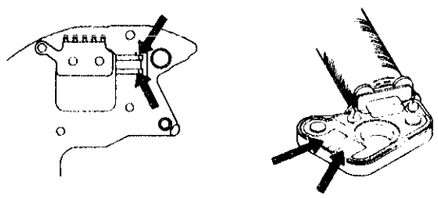
(2) Pull out the crown completely.
When the crown is pulled out to the second click position, Cal. 9923A watch gives signals, which will be computed by the QT-Adapter or Quartz Tester QT-99. While the watch is operating, it is impossible to measure its daily rate accurately.

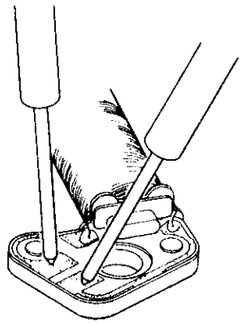
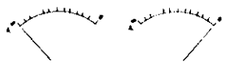
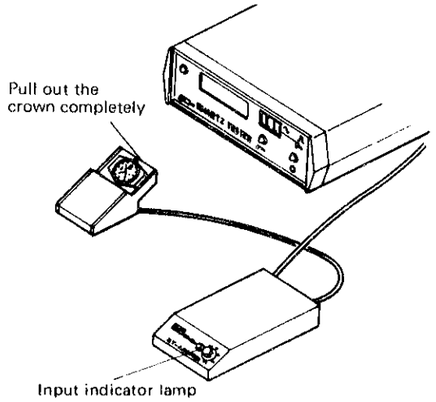
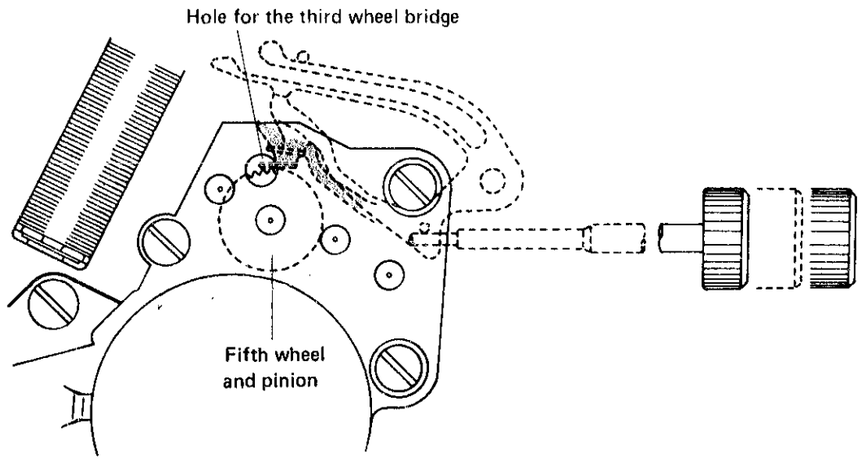
Notes: If Cal. 9923A is measured in the same way as with the existing analogue quartz watches;

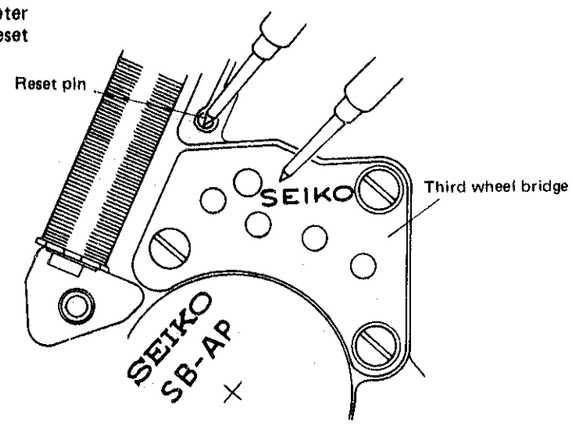
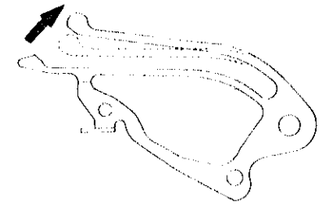
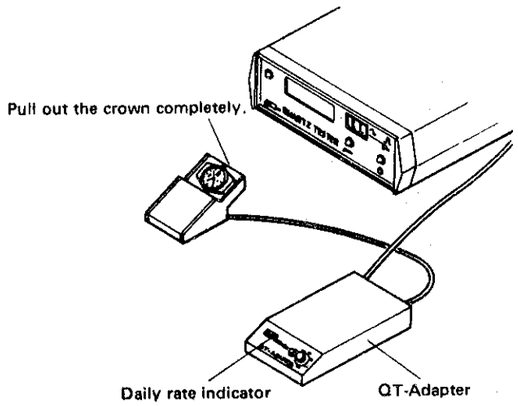
- There will be scatter in measurable value.
- The value displayed does not indicate the correct daily rate.

2. Procedures for checking and adjustment

	Procedure	Result	Adjustment and Repair
A CHECK OUTPUT SIGNAL	**Check output signal.** **1. Set up the Quartz Tester together with the QT-Adapter or set up the Quartz Tester QT-99.** (Set up the QT-Adapter properly according to the instruction.) **2. Pull out the crown completely.** **And then place the watch on the microphone.** (When the crown is pulled out to the second click, Cal. 9923A gives signals for time accuracy measurement.) **3. Check output signal by blinking of the input indicator lamp.** (Unlike the existing analogue quartz watches, Cal. 9923A gives signals at an irregular cycle.)  When the Quartz Tester QT-99 is used, the QT-Adapter is not necessary.	Blinking — Normal No blinking — Defective	Proceed to **B**.
B CHECK BATTERY VOLTAGE	Use the following procedures to check battery voltage. **1. Set up the Volt-ohm-meter.** Range to be used: DC 3V **2. Measuring** ●Probe Red (+) . . . . . Battery surface (+) ●Probe Black (−) . . . .Battery surface (−) **Note:** When handling the battery, be sure to use non-metallic tweezers or fingercots. When there is battery electrolyte leakage, refer to "How to check battery electrolyte leakage and repair" below for repairing.  	More than 1.5V — Normal Less than 1.5V — Defective  	Proceed to **CHECK MECHANICAL PORTION** if blinking is found. Proceed to **CHECK ELECTRONIC CIRCUIT BLOCK** if blinking is not found. Replace the circuit block if the second hand moves at two second intervals. Proceed to **Replace the battery**. ●If the watch operates after battery replacement, proceed to **I**. ●If the watch does not operate after battery replacement, proceed to **CHECK ELECTRONIC CIRCUIT BLOCK**.
HOW TO CHECK BATTERY ELECTROLYTE LEAKAGE AND REPAIR	Procedures 1. Remove the movement from the case. 2. Disassemble the movement. 3. Wipe off battery electrolyte on the circuit block. (1) Wipe off battery electrolyte with a cloth moistened with distilled water. (If distilled water is not available, use tap water.) **Note:** Do not expose the trimmer condenser to water or alcohol. If it is exposed, there may be a change in the condenser capacity and eventually in the time accuracy.	Be sure to wipe off battery electrolyte on the battery connection.  	(2) Wipe them with a cloth moistened with alcohol. (If the cleaned portions remain wet with water, they will corrode with rust.) (3) Dry with cool air by using a dryer. 4. Wipe off battery electrolyte on the other parts. (Rinse the insulator for battery with water.) 5. Reassemble the movement. (Replace the battery with a new one.) 6. Check to see if the time setting functions and the current consumption are normal. **Note:** Replace parts with new ones if they are rusted to the extent that they cannot be used.

	Procedure	Result	Adjustment and Repair
C CHECK BATTERY CONDUCTIVITY	Check to see if the battery current flow to the circuit is normal. 1. Check for any stain on the connecting portions of the battery, plus terminal of battery connection and the battery connection.  	Uncontaminated ——— Normal → Contaminated ——— Defective →	Proceed to **D**. ●Wipe off carefully. **Note:** Be careful not to bend the plus terminal of battery connection and the battery connection.
D CHECK CIRCUIT BLOCK OUTPUT TERMINAL CONDUCTIVITY	Remove the circuit block, and check the connecting portions of the circuit block and the coil.  1. Check to see if the two output terminals are parallel to the edge of the circuit board when the circuit block is viewed from the back side as shown in the illustration on the left.  2. Check to see if the circuit block output terminal rises higher than the head of the pin for circuit block screw when viewed from the side.  3. Check for any contamination on the circuit block output terminal and the coil lead terminal.	Parallel ——— Normal → Bent ——— Defective → Higher ——— Normal → Not higher ——— Defective → Uncontaminated ——— Normal → Contaminated ——— Defective →	Proceed to **D** 2. ●Correct the bend of the output terminal. Proceed to **D** 3. ●Raise the output terminal. Proceed to **E**. ●Wipe off the contamination.

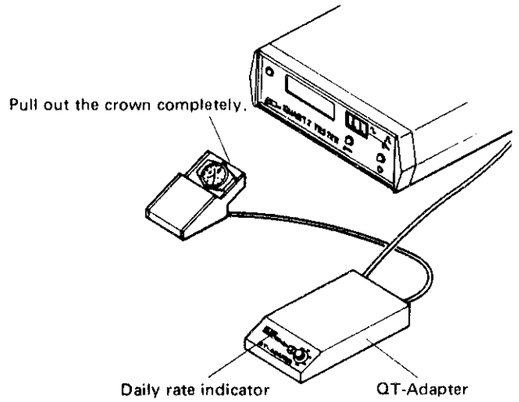
	Procedure	Result	Adjustment and Repair
E CHECK COIL BLOCK	Check for broken coil wire and short circuit of the coil block. **1. Set up the Volt-ohm-meter.** Range to be used: OHMS R x 100 **2. Checking** Apply the red and black probes of the Volt-ohm-meter to the two lead terminals of the coil. 	2.5kΩ ~ 4.5kΩ Normal → (Pointer of the Volt-ohm-meter swings.)  More than 4.5kΩ — Broken coil wire Less than 2.5kΩ — Short circuit → Defective 	Proceed to **F** if Electronic circuit block must be checked. Proceed to **G** if Mechanical portion must be checked. ●Replace the coil block with a new one.
F CHECK OUTPUT SIGNAL	Check for output signal **1. Set up the Quartz Tester and the QT-Adapter.** **2. Checking** Follow the same procedures as in **A**. 	Blinking → Functioning Blinking → Not functioning No Blinking → Defective	Proceed to **I**. Proceed to CHECK MECHANICAL PORTION and **G**. ●Replace the circuit block with a new one.
G CHECK SECOND SETTING CONDITION	Check the second setting condition. Check to see if there is clearance between the second setting lever and the fifth wheel and pinion when the crown is in the normal and the first click positions. Also, check to see if the second setting lever touches the fifth wheel and pinion when the crown is in the second click position. (Check through the hole for the third wheel bridge by using a microscope.) 	Function → Normal Do not function → Defective	Proceed to **H**. ●Correct the bend of the second setting lever.

	Procedure	Result	Adjustment and Repair
H CHECK RESET CONDITION	Check the reset condition after the circuit block and the battery are reassembled. 1. Check to see if the second hand stops immediately when the crown is pulled out completely and if it starts promptly after one second when the crown is pushed in to the normal position. 2. Check to see if the conductivity between the reset pin and the main plate is normal when the crown is pulled out completely. **(1) Set up the Volt-ohm-meter.** Range to be used: **OHMS R x 1** **Note:** Be careful not to use the range other than R x 1. The circuit might be damaged if another range is used. **(2) Disassemble the anti-magnetic shield plate.** (If the probes have sharp tips, it might be possible to check without disassembling the anti-magnetic shield plate. But if the probes touch the anti-magnetic shield plate, the checking result is unreliable.) **(3) Checking** Apply the probes of the Volt-ohm-meter to the third wheel bridge and the reset pin. Either red or black probe will do.  	Stops completely and starts moving after one second ——Normal——▶ Does not stop or moves irregularly ——Defective——▶ Less than 10Ω ——Normal——▶ More than 10Ω ——Defective——▶	Proceed to **I**. Proceed to **H** 2. ● Replace the circuit block with a new one. ● Correct the bend of the second setting lever, or replace the second setting lever with a new one. Be sure to correct the shape so that enough resilience is obtained. 
I CHECK ACCURACY	Check gain and loss of time. **1. Set up the Quartz Tester and the QT-Adapter.** Be sure to measure the time accuracy without disassembling the watch case. (When the Quartz Tester QT-99 is used, the QT-Adapter is not necessary.) **2. Follow the same procedure as in A.** **Note:** At around 24°C* the daily rate measured by the QT-Adapter (or QT-99) may change slightly. In this case, take an average of several measurements. *This is the temperature at which the characteristics of the two quartz crystal oscillators agree with each other.  	Measured value is; Within ±0.05 ——Normal——▶ ±0.05 ~ ±0.20 ——Defective——▶ More than ±0.20 ——Defective——▶ When the user indicates the extent of loss or gain, follow the instructions shown on the next page.	● Follow the procedures on page 11. Proceed to TIME ACCURACY ADJUSTING. Proceed to TIME ACCURACY ADJUSTING after replacing the circuit block. **Note:** When adjusting time accuracy, be sure to follow the instructions shown on the following pages.

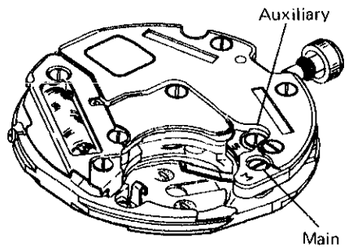
BEFORE ADJUSTING TIME ACCURACY

Procedure	Result	Adjustment and Repair
The time accuracy of Cal. 9923A must be adjusted by far more strictly than that of the existing analogue quartz watches. When adjusting the time accuracy of Cal. 9923A, be sure to follow the procedures below. Check to see which case applies to the watch among the following three.		
I. The user indicates the constant monthly loss or gain of 4 to 6 seconds.	Loses or gains slightly	Proceed to **Time accuracy adjusting**. *1
II. The user indicates the constant monthly loss or gain of more than 6 seconds. Check time accuracy by using the QT-Adapter or QT-99. (See page 13 for details.)	QT-99 or QT-Adapter indicates; More than ±0.20 sec./day	1. Check for any dust and lint on the gear train, check to see if the gear train is properly lubricated and repair a malfunctioning portion. 2. Proceed to **Replace the circuit block**. *2 3. Proceed to **Time accuracy adjusting**. *1
	Less than ±0.20 sec./day	Check for any dust and lint on the gear train, and check to see if the gear train is lubricated properly. ● If a malfunctioning portion is found, repair it and proceed to **Time accuracy adjusting**. *1 ● If malfunctioning portion is not found, **Replace the circuit block** and proceed to **Time accuracy adjusting**. *1, 2
III. The watch loses or gains after the watch case is disassembled and reassembled or replaced. Usually, the daily rate changes slightly after disassembling and reassembling the watch case. Before measuring the time accuracy of Cal. 9923A after repair, be sure to reassemble the watch case.	QT-99 or QT-Adapter indicates; ±0.05 ~ ±0.20 sec./day	Proceed to **Time accuracy adjusting** *2
	More than ±0.20 sec./day	Proceed to **Replace the circuit block** and **Time accuracy adjusting**. *1, 2

Reassemble the case and pull out the crown to the 2nd click, and place the watch on the microphone.



Time accuracy adjusting
- Be sure to adjust the time accuracy by turning the main trimmer condenser.
- Be careful not to turn the auxiliary trimmer condenser.



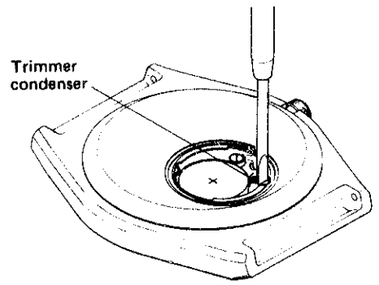
*1 Be sure to adjust time accuracy by following the instructions on the next page after reassembling the watch case and pulling out the crown completely.

*2 Even if the Quartz Tester does not indicate the daily rate of ± 0.20 sec./day after the circuit block is replaced, proceed to **Time accuracy adjusting**.

TIME ACCURACY ADJUSTING FOR THE WATCH WITH BATTERY HATCH

Procedure

- Be sure to use the QT-99 or QT-Adapter when adjusting time accuracy.
- The Cal. 9923A is available in two types of case back: Case back with battery hatch and that without battery hatch. For the watch with battery hatch, be sure to adjust the time accuracy with the case back attached as shown in the illustration on the right.
  (The reason is that disassembling and reassembling of the case back will affect the daily rate slightly. This is negligible to the ordinary watches, but it is not negligible to the watch such as Cal. 9923A which maintains extemely high time accuracy.)
  Refer to the following page for adjusting the time accuracy of the watch without battery hatch.
- While watching the value indicated by the QT-Adapter or QT-99, adjust the time accuracy by following the procedures below.



When the user indicates the extent of loss or gain of the watch.

(Ex.) The watch gains constantly 3 seconds a month.

Step 1. Reduce the gain to a daily rate.
3 sec. ÷ 30 days = +0.10 sec./day

Step 2. Read the daily rate indicated by the QT-Adapter or QT-99.
+0.08 sec./day.

Step 3. Calculate the difference between the gain (in daily rate) and the measured daily rate.
+0.08 - (+0.10) = -0.02 sec./day
Then adjust the trimmer condenser so that the QT-Adapter indicates the daily rate of -0.02 sec./day.

When the user complains of loss or gain, but does not indicate how much it is. Or when time accuracy adjusting is required after the watch case is disassembled and reassembled or replaced with a new one.

Adjust the trimmer condenser so that the QT-Adapter indicates +0.01. (Adjust to within -0.02 ~ +0.03 sec./day.)

Note: For Cal. 9923A, time accuracy must be adjusted to a hundredth of a second. So the trimmer condenser must be turned most carefully by degrees.

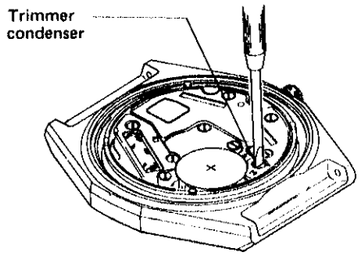
- After the time accuracy is adjusted and the battery hatch is attached, warm the watch for about 5 minutes in your palm. (The watch will be warmed to about 30°C.) When the temperature of the watch has risen adequately, check the daily rate again. (Standard: -0.04 ~ +0.05)

Note:. In practically all cases, the standard value above will be satisfied. Should any value other than the standard be given, adjust again the time accuracy.

TIME ACCURACY ADJUSTING FOR THE WATCH WITHOUT BATTERY HATCH

Procedure

- Be sure to use the QT-99 or QT-Adapter when adjusting time accuracy.
- While watching the value indicated by the QT-Adapter or QT-99, adjust the time accuracy by following the procedures below.



When the user indicates the extent of loss or gain of the watch.

(Ex.) The watch gains constantly 3 seconds a month.

Step 1. Measure the daily rate before adjusting time accuracy. +0.12 sec./day

Step 2. Measure the daily rate with the case back disassembled.
+0.09 sec./day
+0.09 - (+0.12) = -0.03 sec./day

Step 3. Reduce the gain to a daily rate.
3 sec. ÷ 30 days = +0.10 sec./day

Step 4. Calculate the difference between the gain (in daily rate) and the measured daily rate.
+0.09 - (+0.10) - (-0.03) = +0.02 sec./day

Step 5. Check again the daily rate with the case back reassembled.

When the user complains of loss or gain, but does not indicates how much it is. Or when time accuracy adjusting is required after the watch case is disassembled and reassembled or replaced with a new one.

Adjust the trimmer condenser so that the QT-Adapter or QT-99 indicates +0.01 with the case back of the watch reassembled. Adjust to within -0.02 ~ +0.03 sec./day.

Note: For Cal. 9923A, time accuracy must be adjusted to a hundredth of a second. So the trimmer condenser must be turned most carefully by degrees.

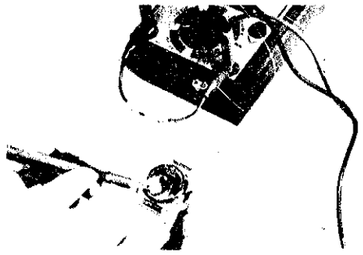
- After the time accuracy is adjusted and the battery holder is attached, warm the watch for about 5 minutes in your palm. (The watch will be warmed to about 30°C.) When the temperature of the watch has risen adequately, check the daily rate again. (Standard: -0.04 ~ +0.05)

Note: In practically all cases, the standard value above will be satisfied. Should any value other than the standard be given, adjust again the time accuracy.

MEASURING CURRENT CONSUMPTION

Procedure

In case a frequent battery change is required, make a current consumption test by following the procedures below.
Use the Micro Test or the Volt-ohm-meter for measuring current consumption. In the following case, the Volt-ohm-meter S-831 is used.



1) Set up the Volt-ohm-meter.
   - Range to be used: DC 12μA (blue)
   - Set up the condenser kit of 200 ~ 500μF as shown in the photo.
2) Prepare the watch.
   - Touch the (+) surface of the battery to the crown, as shown in the photo.
3) Measuring
   Probe Red (+) . . . . Battery connection
   Probe Black (-) . . . Battery surface (-)

Note) Be sure to measure the current consumption with the crown in the normal position.

If the pointer of the Volt-ohm-meter swings over the maximum value, change over the measuring range to DC 30mA and turn it back to DC 12μA with the probes touched to the specified portions.

Remarks:
Current consumption would be measured more accurately if the current supplier is used instead of using the above procedure. (For the operation of the current supplier, refer to its instruction.)

Result		Adjustment and Repair
Less than 2.0μA	Normal →	• Current consumption is normal.
More than 2.0μA	Defective →	• Replace the circuit block with a new one.

All procedures of Disassembling, Reassembling, Checking and Adjustment are completed.