SEIKO

QUARTZ

Cal. 2320A

PARTS LIST

Cal. 2320A


131 810


221 810

225 810


231 810


241 810


261 810


271 810


281 810

282 810

☆354 811


383 810


384 810


386 810


391 810


491 810


4001 810


4002 810


4146 810


4216 810


4219 810


4239 810


4242 810


4270 810


☆Toshiba W1V


022 110


022 424

022 740

2/1

Cal. 2320A

Characteristics

Casing diameter:	15.1 × 13.0 mm
Maximum height:	2.5 mm without battery
Jewels:	8j
Frequency of quartz crystal oscillator:	32,768 Hz (Hz=Hertz . . . . . cycle per second)
Driving system:	Step motor system (2 poles)
Regulation system:	Rotary step switch type

PART NO.	PART NAME
131 810	Third wheel bridge
221 810	Center wheel & pinion
☆**225 810**	Cannon pinion
☆225 811	
231 810	Third wheel & pinion
241 810	Fourth wheel & pinion
261 810	Minute wheel
☆**271 810**	Hour wheel
☆271 811	
281 810	Setting wheel
282 810	Clutch wheel
☆354 810	Winding stem
☆**354 811**	
383 810	Setting lever
384 810	Yoke (Clutch lever)
386 810	Setting lever spring
391 810	Second setting lever
491 810	Dial washer
4001 810	Circuit block
4002 810	Coil block
4146 810	Step rotor
4216 810	Insulator for battery connection A
4219 810	Insulator for battery connection B
4239 810	Rotor stator
4242 810	Plus terminal of battery connection
4270 810	Battery connection
011 547	Upper hole jewel for third wheel
011 547	Upper hole jewel for fourth wheel
011 547	Upper hole jewel for fifth wheel
011 547	Lower hole jewel for fifth wheel
011 550	Lower hole jewel for third wheel
011 550	Lower hole jewel for fourth wheel
011 551	Upper hole jewel for center wheel
011 726	Lower hole jewel for center wheel
022 110	Dial screw
022 424	Third wheel bridge screw
022 424	Circuit block screw
022 424	Coil block screw
022 740	Setting lever spring screw
023 345	Tube for yoke
027 823	Minute wheel pin
027 827	Second setting lever adjusting pin
027 828	Guide pin for setting lever spring
027 833	Pin for unlocking stem
027 834	Setting lever pin

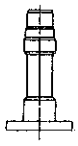
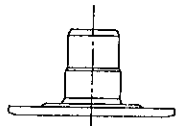
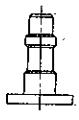
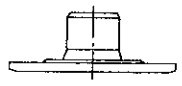
PART NO.	PART NAME
☆Toshiba W1V	Silver oxide battery
☆Maxell SR620SW	

☆ ⇨Please see remarks.
Part numbers in light letters are not shown in photos.

Cal. 2320A

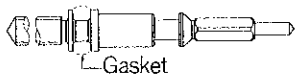
Remarks:

Cannon pinion, Hour wheel
Combination

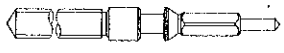
Type	Cannon pinion	Hour wheel
a (Dials with index jewels)	 225 811	 271 811
b (Dials other than the above)	 225 810	 271 810

Winding stem·····There are two types of winding stem. Select a suitable one by referring to the design of the case.

☆354 810·····The gasket is fixed to the winding stem.



☆354 811·····The gasket is fixed to the crown.



If the combination of the winding stem and case is unknown, check the case number and refer to **"SEIKO Quartz Casing Parts List"** to choose a corresponding winding stem.

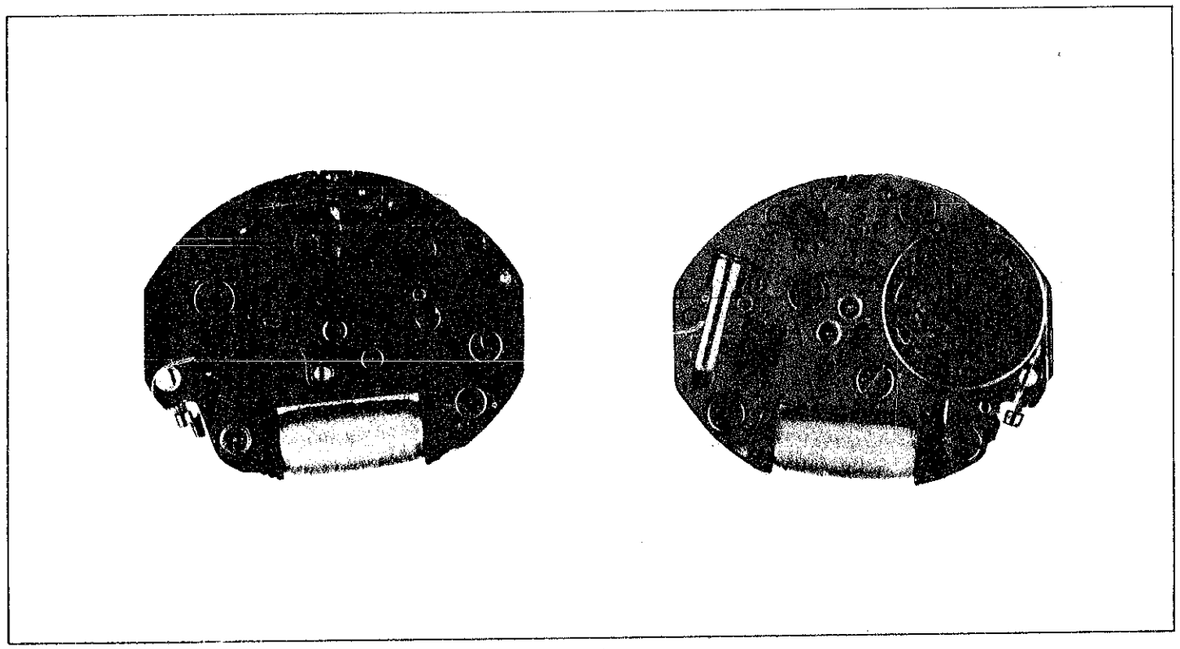
Battery·····The applied battery for this calibre might be added the substitutive in the future.
In that case, please refer to separate "BATTERIES FOR SEIKO QUARTZ WATCHES".

TECHNICAL GUIDE

SEIKO

QUARTZ

CAL.2320A



CONTENTS

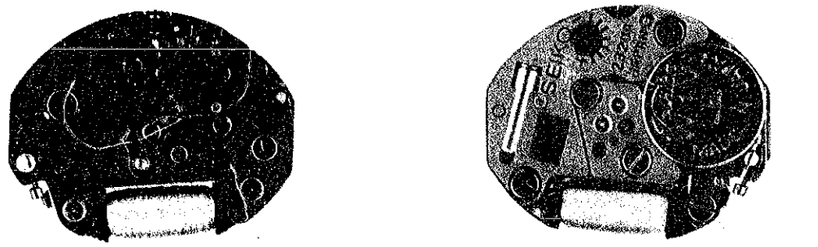
I. SPECIFICATIONS AND FEATURES

1. Specifications

Item \ Cal. No.	2320A
Time indication	2-hand time indication (hour & minute)
Additional mechanism	Electronic circuit reset switch
Crystal oscillator	32,768 Hz (Hz=Hertz . . . . . Cycle per second)
Loss/gain	Loss/gain at normal temperature range Monthly rate : less than ±15 seconds (Annual rate : less than ± 3 minutes)
Casing diameter	15.1mm x 13.0mm
Height	2.5mm without battery
Operational temperature range	-10°C ~ +60°C (14°F ~ 140°F)
Driving system	Step motor system (2 poles: steps once every 20 seconds)
Regulation system	Rotary step switch system
Battery power	Silver oxide battery Toshiba W1V or Maxell SR620SW Battery life is approximately 3 years. Voltage: 1.55V
Jewel	8 jewels

2. Features

Cal. 2320A is a thin and compact 2-hand crystal oscillator ladies' watch incorporating the 3-year life battery and the movement with the height of 2.5mm without battery, specially designed for use as a dress watch.



Movement

3. Time accuracy adjusting

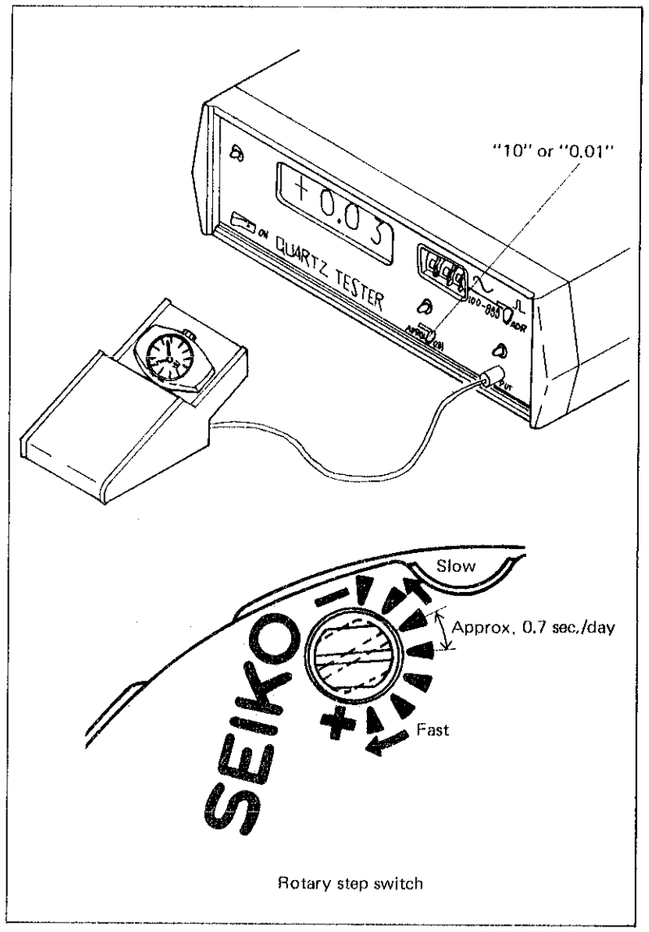
For time adjustment a new rotary step switch system is employed in Cal. 2320A different from the conventional trimmer condenser system. As the different time adjustment is necessary, adjust time according to the following procedures.

Time adjustment procedures:

1 First check time accuracy with the Quartz Tester. Be sure to set the measuring time selection switch at "10" or "0.01". Measurement is impossible if the selection switch is set at other measuring times than "10" or "0.01".

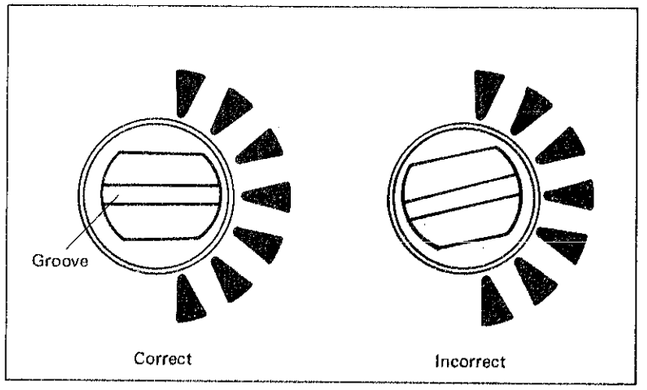
2 Next turn the rotary step switch and adjust.
- Every 1-step turn of the rotary step switch will make a change of about 0.7 seconds fast or slow per day (gaining by turning clockwise and losing by turning counterclockwise).
- Adjust the rotary step switch at a step nearest "0" in loss or gain per day.

3 After having turned the rotary step switch, be sure to check time accuracy with the Quartz Tester.



Rotary step switch

When turning the rotary step switch, fit the center line of the groove to the ◀ mark. If the center line of the groove is not in line with the ◀ mark, time accuracy may change excessively.



Correct Incorrect

II. DISASSEMBLING, REASSEMBLING AND LUBRICATING

- **Disassembling and reassembling**

Disassembling procedures Figs. : ① ~ ㉚

Reassembling procedures Figs. : ㉚ ~ ①

- **Lubricating**

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

Types of oil	Oil quantity
Moebius A	Liberal quantity
SEIKO Watch Oil S-6	Normal quantity
Never lubricate the portions marked ⊗	Extremely small quantity

- **After-sale servicing instruments and materials**

Use the movement holder S-664 commonly used for Cal. 16 when disassembling and reassembling.

- **List of screws used**

The following three types of screws are used in Cal. 2320A.

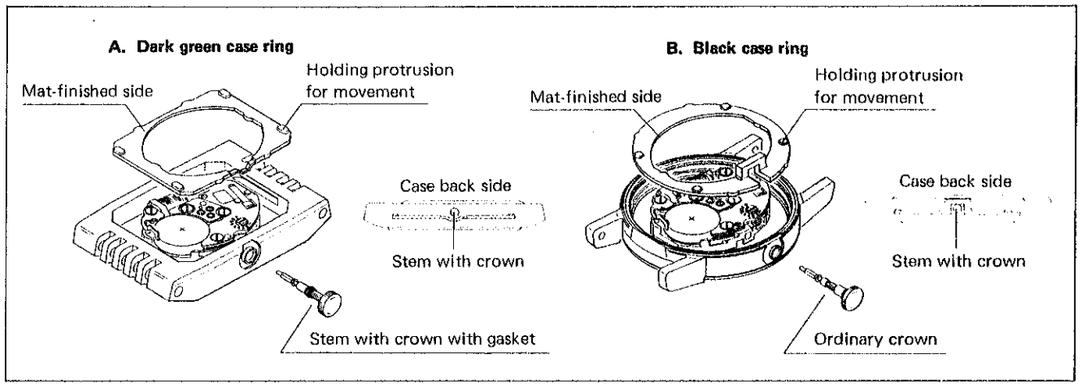
Shape	Parts No.	Name (common)	Shape	Parts No.	Name (common)
	022 110	Dial screw (2 pcs.)		022 424	Third wheel bridge screw (2 pcs.) Circuit block screw (2 pcs.) Coil block screw (1 pc.)
	022 740	Setting lever spring screw (3 pcs.)			

- **Remarks for disassembling and reassembling**

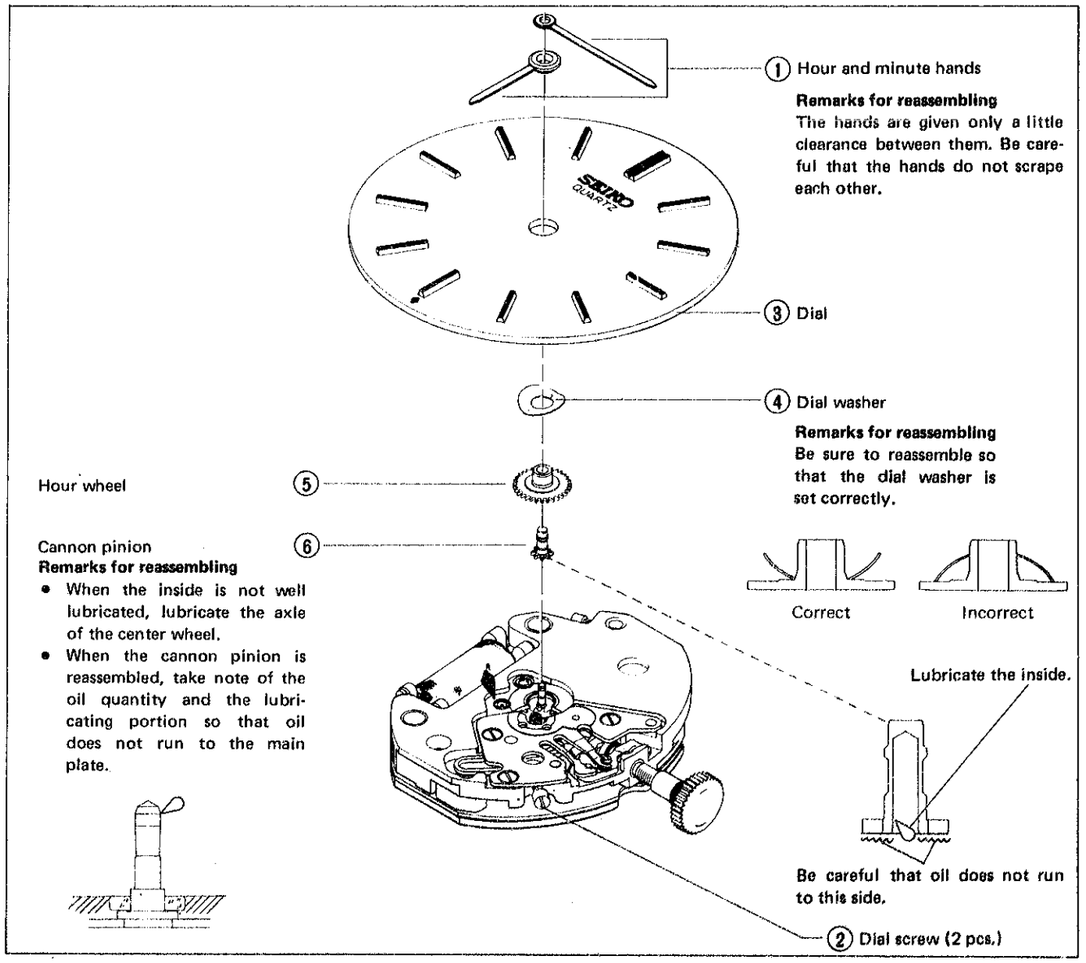
Cal. 2320A is a thin and compact watch. Therefore check for dust, lint or other contamination to prevent the watch from stopping.

1. Remarks for disassembling and reassembling of the case

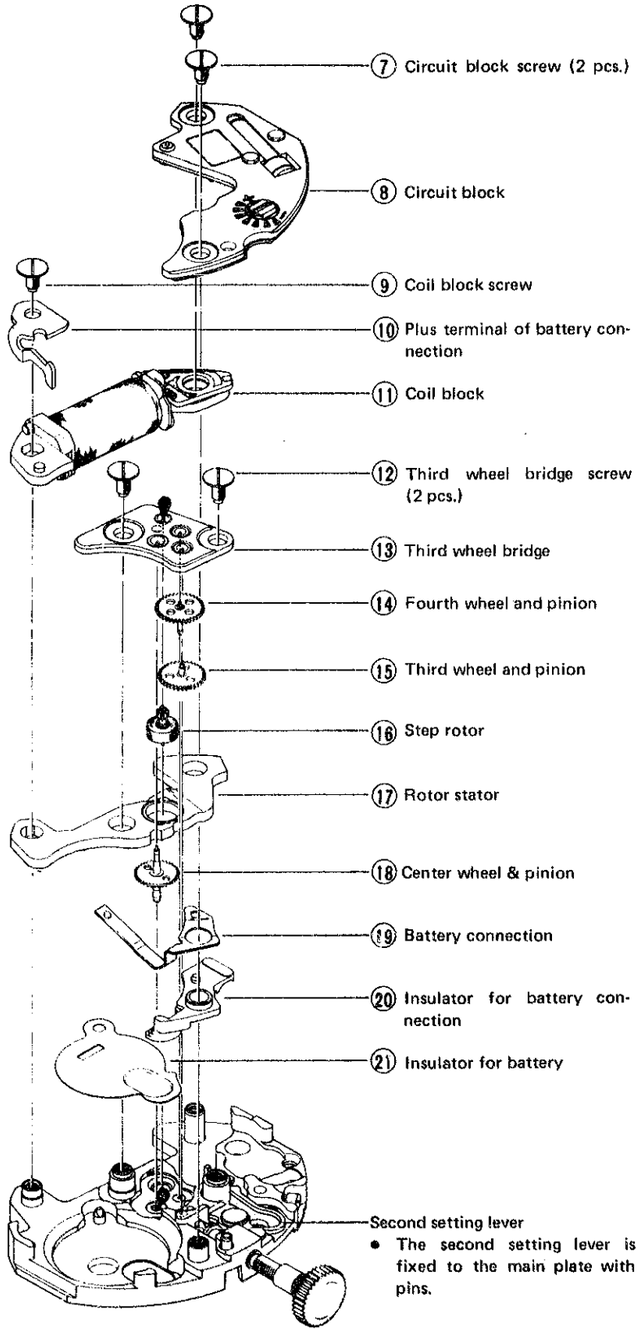
- The case ring is classified into the following two types according to the shapes of the grooves for the stem with crown. Be careful not to mistake the upper side for the lower side.



2. Disassembling, reassembling and lubricating of the minute hand ~ hour wheel



3. Disassembling, reassembling and lubricating of the circuit block, coil block and gear train mechanism



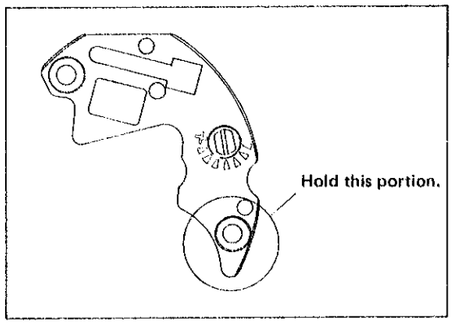
Remarks for disassembling and reassembling of the gear train

- Be sure to disassemble and reassemble the gear train with the crown at the pushed in position (in order to avoid damaging parts through the interference between the second setting lever and the gear).
- The gear train mechanism, except for the step rotor and the lower hole jewel for center wheel may not be lubricated. When lubricating, lubricate it to an extent that it gets wet.

Remarks for disassembling and reassembling

⑧ Circuit block

Remarks for disassembling and reassembling

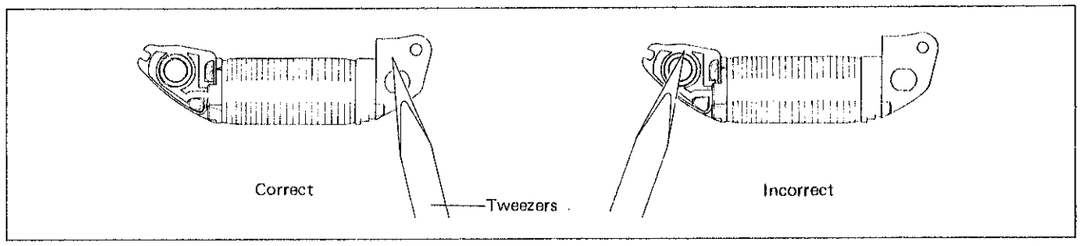


- Be careful not to cut the copper leaf patterns of the circuit block with tweezers, etc.
- Be careful not to deform the terminal of the rotary step switch.
- Do not touch each element.

⑪ Coil block

Remarks for disassembling and reassembling

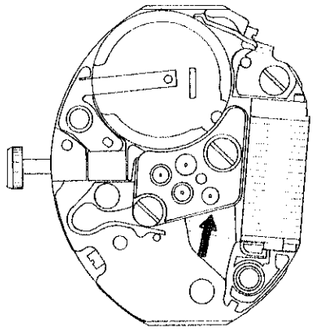
- Handle the coil block as shown in the illustration below so as not to scratch the coil wire and the lead terminal. And be careful not to deform it.



⑯ Step rotor

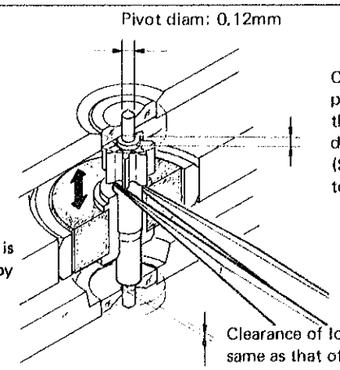
Remarks for reassembling

- Check for the clearances of the upper and lower pivots for the step rotor after reassembling the coil block screw ⑨.



The step rotor is suspended in air by magnetic force.

Make sure of the clearances of the upper and lower pivots for the step rotor from the arrow-marked direction with the microscope.



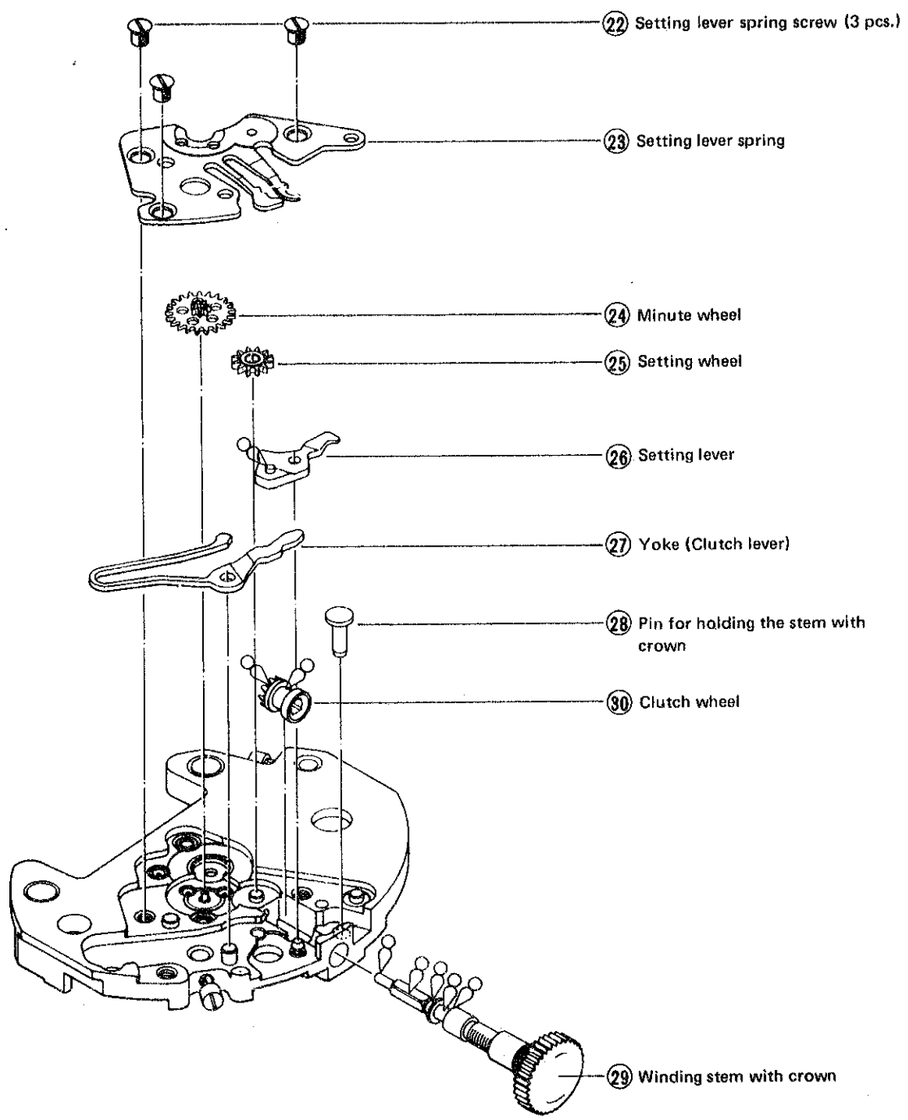
Check to see if the step rotor moves upward and downward from its standstill position by using a probe or pointed tweezers. (If the step rotor cannot be lifted up, it indicates no clearance of the upper pivot. Correct the clearance by moving the upper hole jewel.)

⑲ Battery connection
⑳ Insulator for battery connection
㉑ Insulator for battery

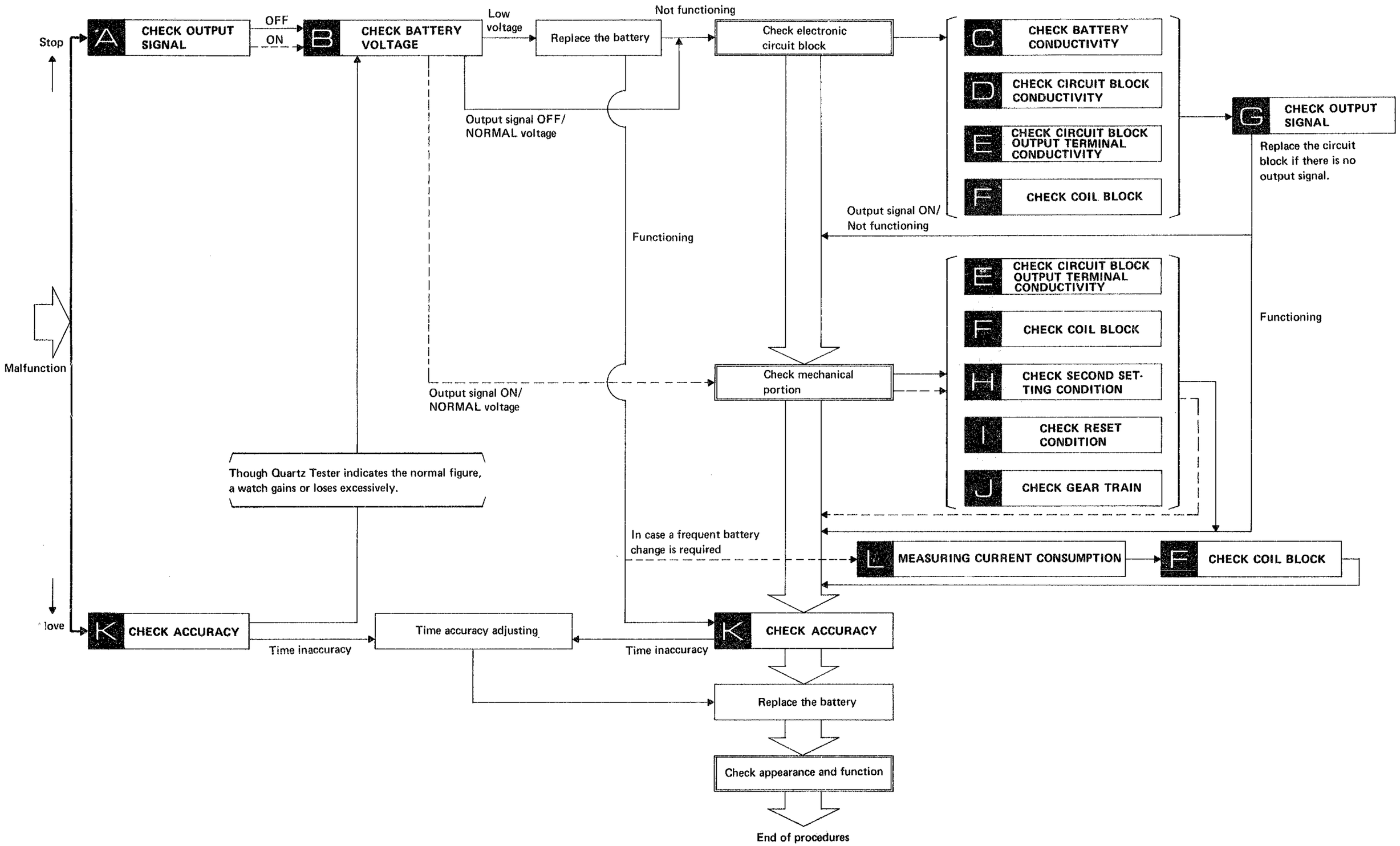
Remarks for disassembling

The above mentioned 3 parts are not required to be disassembled except when the parts are replaced and cleaned.

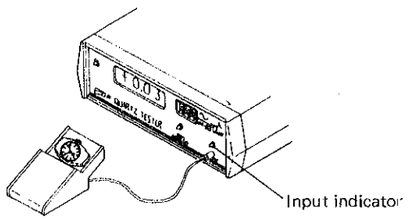
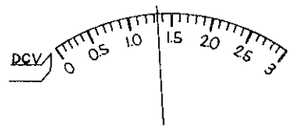
4. Disassembling, reassembling and lubricating of the setting mechanism



1. Guide table for checking and adjustment



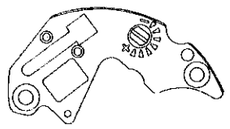
2. Procedures for checking and adjustment

	Procedures	Results	Adjustment and repair
A CHECK OUTPUT SIGNAL	Check output signal. 1. Set up the Quartz Tester. **Note:** Be sure to set the measuring time selection switch at "10" or "0.01". 2. Checking Check for blinking input indication light. The blinking intervals are 5 seconds and 10 seconds.  **Note:** • Check output signal with the crown pushed in to the normal position. • When using QT-200, connect the earth terminal with the release terminal.	Blinking — Normal No blinking — Defective	Proceed to B.
B CHECK BATTERY VOLTAGE	Check battery voltage. 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 in checking A. Proceed to Check electronic circuit block if blinking is not found in checking A. Replace the battery . • If the watch functions after battery replacement, proceed to K. • If the watch does not function, proceed to Check electronic circuit block.

HOW TO CHECK BATTERY ELECTROLYTE LEAKAGE AND REPAIR

Procedures:

1. Remove the movement from the case.

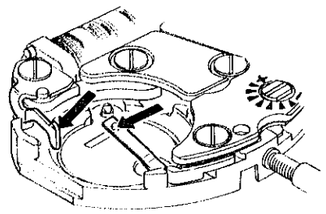
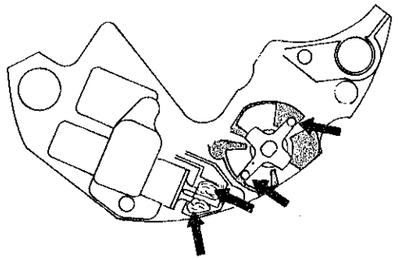
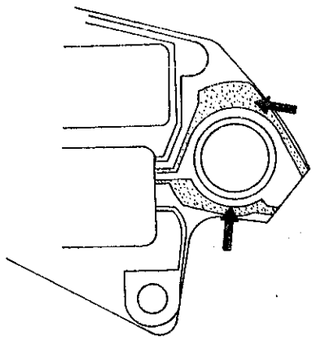
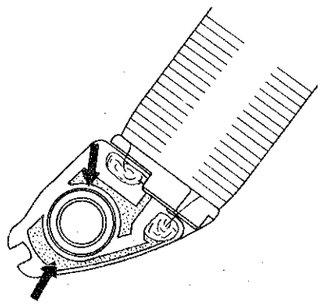


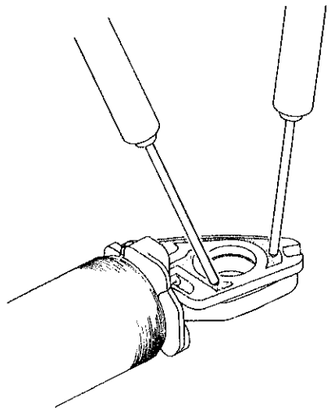
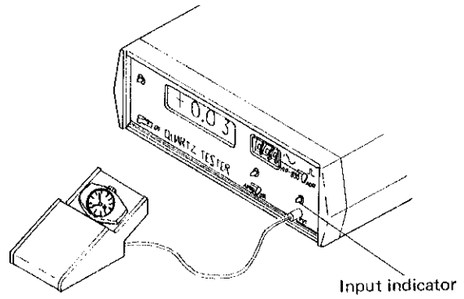
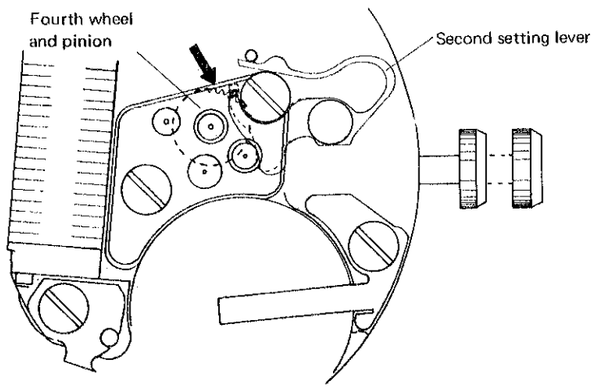
2. Disassemble the movement.
3. Wipe off battery electrolyte on the circuit block.
   (1) Wipe off battery electrolyte with a cloth moistened with distilled water. (If distilled water is not available, use tap water.)
   (2) Wipe off with a cloth moistened with alcohol. (If the cleaned portions remain wet with water, they will corrode with rust.)
   (3) Dry with hot air by using a dryer.
4. Clean off the parts contaminated with battery electrolyte, such as the battery connection. (Rinse the insulator for battery with water.)

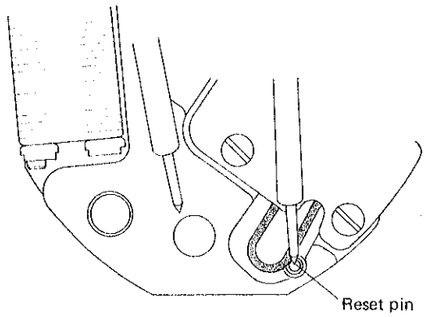
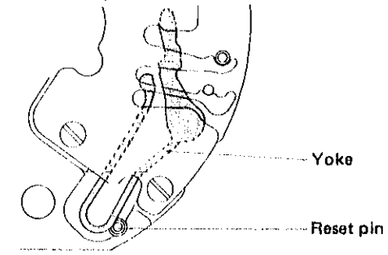
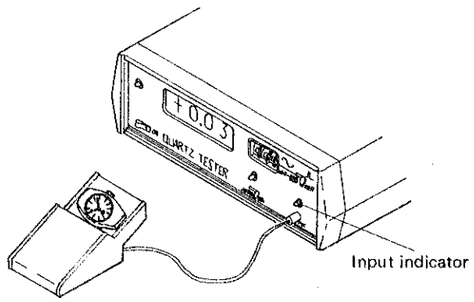
   Be sure to wipe off battery electrolyte on the battery connection.

5. Reassemble the movement.
   (Replace the battery with a new one.)
6. Check to see if the setting functions and the current consumption are normal.

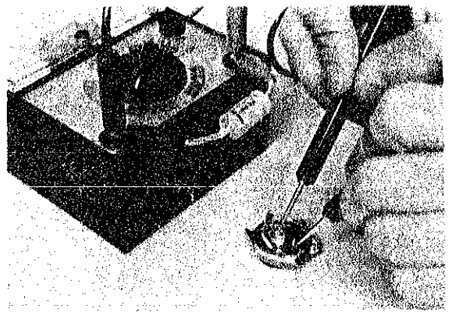
Note: If the battery connection or circuit block is completely corroded with rust and cannot be corrected by cleaning, replace it with a new one.

	Procedures	Results	Adjustment and repair
C CHECK BATTERY CONDUCTIVITY	Check to see if the battery current flow to the circuit is normal. Check for any foreign matter on the connecting portions of the battery, the plus terminal of battery connection and the battery connection.  	Uncontaminated — Normal →	Proceed to D.
		Contaminated — Defective →	Wipe off any foreign matter. **Note:** Be careful not to bend the plus terminal of battery connection and the battery connection.
D CHECK CIRCUIT BLOCK CONDUCTIVITY	Check for any short circuit and defective conductivity of the conductive portions of the circuit block. Disassemble the circuit block and check conductivity of the arrow-marked portions by using a microscope. 	No short circuit or defective conductivity — Normal →	Proceed to E.
		Short circuit and defective conductivity — Defective →	Replace the circuit block with a new one.
E CHECK CIRCUIT BLOCK OUTPUT TERMINAL CONDUCTIVITY	Disassemble the circuit block and check the connecting portions of the circuit block output terminal and the coil block. Check for any foreign matter on the circuit block output terminal and the coil lead terminal.  	Uncontaminated — Normal →	Proceed to F.
		Contaminated — Defective →	Wipe off any foreign matter.

	Procedures	Results	Adjustment and repair
F CHECK COIL BLOCK	Check for broken coil wire and short circuit of the coil block after disassembling the circuit block. 1. Set up the Volt-ohm-meter. Range to be used: OHMS R x 100 2. Checking Apply the probes of the Volt-ohm-meter to the two coil lead terminals. Each of the red and black probes may touch either of the two coil lead terminals. 	Pointer of the Volt-ohm-meter swings — Normal →	Proceed to G if the electronic circuit block must be checked. Proceed to H if the mechanical portion must be checked.
		Broken coil wire (Pointer of the Volt-ohm-meter hardly swings) — Defective →	Replace the coil block with a new one.
		Short circuit (Pointer of the Volt-ohm-meter swings excessively) — Defective →	Replace the coil block with a new one.
G CHECK OUTPUT SIGNAL	Check output signal. 1. Set up the Quartz Tester. 2. Checking Follow the same procedures as in A . 	Blinking — Functioning (at 20-second intervals) →	Proceed to K .
		Blinking — Not functioning →	Proceed to Check mechanical portion H .
		No blinking — Defective →	Replace the circuit block with a new one.
H CHECK SECOND SETTING CONDITION	Check to see if the second setting condition is normal. Check to see if there is clearance between the second setting lever and the fourth wheel and pinion when the crown is in the first click position and if the second setting lever touches the fourth wheel and pinion in the second click position. (Check through the hole of the third wheel bridge by using a microscope.) Check with the circuit block removed. 	Functions — Normal →	Proceed to I .
		Does not function — Defective →	Correct the bend of the spring of the second setting lever if there is any. (If it is impossible to correct, replace the second setting lever with a new one.)

	Procedures	Results	Adjustment and repair
I CHECK RESET CONDITION	Check the reset condition after the circuit block and the battery are reassembled. (1) Check to see if the step rotor stops immediately when the crown is pulled out completely (hold for 20 seconds or more) and if it starts after 20 seconds when the crown is pushed in. (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. Checking Apply the probes to each of the main plate and the rest pin. Each of the red and black probes may touch either of the main plate and the reset pin.  Do not push the reset pin strongly.	Stops completely and starts moving after 20 seconds — Normal →	Proceed to K.
		Does not stop or moves irregularly — Defective →	Proceed to J 2.
		Less than 10Ω — Normal →	Proceed to J.
		More than 10Ω — Defective →	Make the repairs below as the contact between the reset pin and the yoke is defective. 1. Check for the bend of the yoke and the reset pin and correct if any.  2. Check the contacting portions of the reset pin and the yoke for dust, lint and contamination and remove it if any.
J CHECK GEAR TRAIN	Check the gear train with respect to the following points. 1. Check for dust, lint and filings. 2. Check for oil condition (quantity, deterioration, etc.). 3. Check to see if the clearance is normal.	Normal →	Replace the circuit block with a new one.
		Defective →	Correct the defective portions. (Removal of dust, lint and filings, relubricating and adjustment of clearance.)
K CHECK ACCURACY	Check gain and loss of time. 1. Set up the Quartz Tester. 2. Checking Follow the same procedures as in A.  	Normal →	Follow the procedures in the Guide table for checking and adjustment on page 8.
		Defective →	Proceed to Time accuracy adjusting (See page 2.)

MEASURING CURRENT CONSUMPTION

Procedures	Results	Adjustment and repair
In case a frequent battery change is required, a current consumption test is recommended. Measure the current consumption with the Volt-ohm-meter of as small range as possible (12μA or less). The measurement with the SEIKO Volt-ohm-meter S-831 is described below. **Procedures:** 1. Set up the Volt-ohm-meter. • Range to be used: DC 12μA • Set up the condenser of 200~500μF as shown in the photo. 2. Set the watch. • Place the battery on the third wheel bridge with its minus side up. 3. Measurement Probe Red (+) ----- Battery connection Probe Black (–) ----- Battery surface (–) **Note:** Be sure to measure with the crown pushed in.  If the pointer of the Volt-ohm-meter scales out, proceed as follows: Reset the rotary step switch to DC 30mA and return to DC 12μA and measure with the probes applied. **Note:** Cal. 2320A moves at 20-second intervals. In order to get a stable reading, continue to measure for 2 to 3 minutes. **(Remarks)** The use of the Current Supplier (S-833), instead of placing the battery on the third wheel bridge, enables a surer measurement. (See the Instruction Manual for the Current Supplier S-833.)	Less than 0.6μA ——— Normal ———→	The current consumption is normal.
	More than 0.6μA ——— Defective ———→	If the coil block is normal, replace the circuit block with a new one.
		All procedures of Disassembling, Reassembling, Checking and Adjustment are completed.