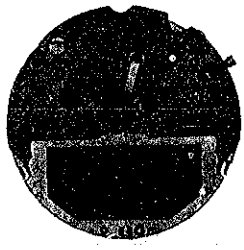
# SEIKO

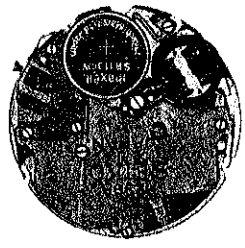
## QUARTZ

## Cal. H239A

# PARTS LIST

# Cal. H239A





125 003

☆221 025

231 135

241 303

261 017

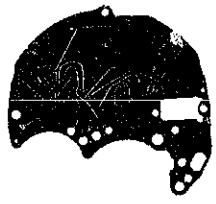
☆271 054



354 065

491 004

735 007



4001 307

4002 130

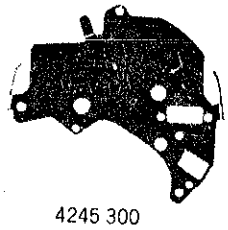


4146 130

4216 304

4238 480

4239 300



4245 300



4247 136

4256 003

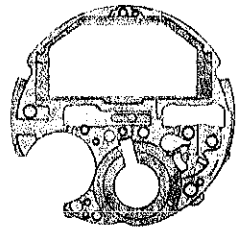
☆4256 004

4270 300

4271 300

4282 131

4313 028



4398 300

4398 303

☆4398 304



4408 023

4408 024

4450 134

4510 090

☆4580 300

4580 301



☆4991 002



4991 003



011 409



011 541

☆Toshiba SR1130W

012 292 012 470 012 483 017 213 017 214 017 216 017 217 017 252 2/1

☆⇨Please see remarks on the next reverse page.

# Cal. H239A

## Characteristics

Casing diameter : ϕ 30.0 mm
Maximum height: 3.1 mm without battery
Jewels : 2 j
Frequency of quartz crystal oscillator : 32,768 Hz (Hz Hertz . . . . Cycles per second)
Analogue indication : Two hand time indication (Hour and minute)
Hand setting system : Automatic electronic-hand-setting by crown (turning the crown clockwise or counter clockwise)
Digital time display : Hour (24 hour indication or 12 hour indication), minute, second and "A.M." "P.M." (displayed only in the 12 hour indication.)
Digital calendar function : Date and day of the week. (The month is displayed only when the calendar is adjusted.)
Digital alarm display : Can be set to operate at any desired hour and minute.
Digital stop watch display : Digital display system showing minute, second and 1/10 second up to 30 minutes.
Digital "Local" time display : Hour, minute, "A.M." "P.M." mark (displayed only in the 12-hour indication) and local (L) mark.
Driving system : Step motor (2 poles)
Regulation system : Trimmer condenser
Display medium : Nematic Liquid Crystal, FE-Mode.
Time signal : It can be set to ring every hour on the hour.
Battery life indicator : All the digits in the display begin flashing.

| PART NO. | PART NAME |
|---|---|
| **125 003** | Train wheel bridge |
| ☆**221 025** | Center wheel & pinion (2.92 mm) |
| ☆221 301 | Center wheel & pinion (3.12 mm) |
| ☆221 302 | Center wheel & pinion (3.22 mm) |
| **231 135** | Third wheel & pinion |
| **241 303** | Fourth wheel & pinion |
| **261 017** | Minute wheel |
| ☆**271 054** | Hour wheel (1.38 mm, silver) |
| ☆271 301 | Hour wheel (1.48 mm, silver) |
| ☆271 302 | Hour wheel (1.58 mm, gold) |
| **354 065** | Winding stem |
| **491 004** | Dial washer |
| **735 007** | Winding stem holder |
| **4001 307** | Circuit block |
| **4002 130** | Coil block |
| **4146 130** | Step rotor |
| **4216 304** | Insulator for circuit block |
| **4238 480** | Switch lever spring |
| **4239 300** | Rotor stator |
| **4245 300** | Switch spring |
| **4247 136** | Bush for contact point lever |
| ☆**4256 003**<br>☆**4256 004** | Speaker block fixing spring |
| **4270 300** | Battery connection (−) |
| **4271 300** | Battery connection (+) |
| **4282 131** | Contact point lever |
| **4313 028** | Connector |
| **4398 300** | Liquid crystal panel frame |
| **4398 303**<br>☆**4398 304** | Speaker block frame |
| **4408 023** | Circuit board washer |
| **4406 024** | Friction washer for contact point lever |
| **4450 134** | Switch lever |
| **4510 090** | Liquid crystal panel |
| ☆**4580 300**<br>**4580 301** | Speaker block |
| ☆**4991 002**<br>**4991 003** | Speaker gasket |
| **011 409** | Upper hole jewel for step rotor |
| **011 541** | Lower hole jewel for step rotor |
| **012 292** | Train wheel bridge screw |
| **012 292** | Circuit block screw (B) |
| **012 292** | Battery connection (+) screw |
| **012 470** | Circuit block screw (C) |
| **012 483** | Circuit block screw (A) |
| **017 213** | Tube for train wheel bridge |
| **017 214** | Tube for circuit block screw (A) |
| **017 216** | Tube for circuit block screw (B) |
| **017 216** | Tube for battery connection (+) screw |
| **017 217** | Tube for circuit block |
| **017 252** | Tube for circuit block screw (C) |
| ☆ Toshiba SR1130W<br>☆U.C.C. 389<br>☆ Maxell SR1130W<br>☆ Toshiba WG10 | Silver oxide battery |

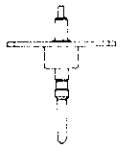
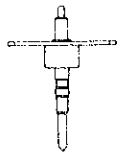
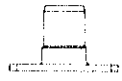
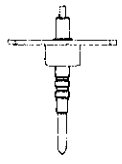
☆ ⇨ Please see remarks on the reverse page.
Part numbers in light letters are not shown in photos.

# Cal. H239A

**Remarks :**

**Center wheel & pinion, Hour wheel.**

There are three different types as specified below.
Combination

| Type | Center wheel & pinion | Hour wheel |
|---|---|---|
| a |  ☆221 025 | Silver ☆271 054 |
| b |  ☆221 301 | Silver  ☆271 301 |
| c |  ☆221 302 | Gold ☆271 302 |

**Speaker block fixing spring, Speaker block frame, Speaker block, Gasket for speaker block.**

☆4256 004
☆4398 304
☆4580 300
☆4991 002
……The parts designated with these parts numbers are manufactured specially for the water resistant case of a pressure of 10 atmospheres (100 meters or 300 feet). Be sure to use these parts for maintaining high water-resistant quality.

**Battery**

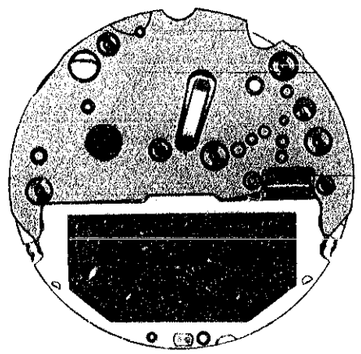
☆U.C.C. 389
☆Maxell SR1130W
☆Toshiba WG10
☆Toshiba SR1130W
……The substitutive battery might be added to the applied battery in the future. In that case, please refer to separate **"BATTERY LIST FOR SEIKO QUARTZ WATCHES"**.

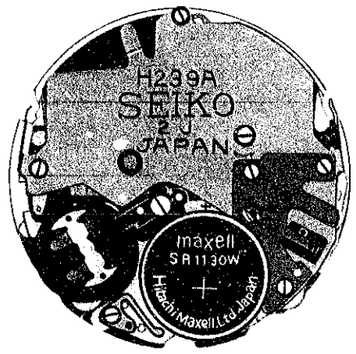
# TECHNICAL GUIDE

SEIKO

QUARTZ

## CAL. H239A






CONTENTS


Page

I. SPECIFICATIONS ..... 1

II. STRUCTURE OF THE CIRCUIT BLOCK ..... 1

III. DISASSEMBLING, REASSEMBLING AND LUBRICATING ..... 2

1. Disassembling and reassembling of the case ..... 2
2. Indicating mechanism ..... 3
3. Electronic circuit and liquid crystal panel ..... 4
4. Gear train and switch mechanism ..... 5

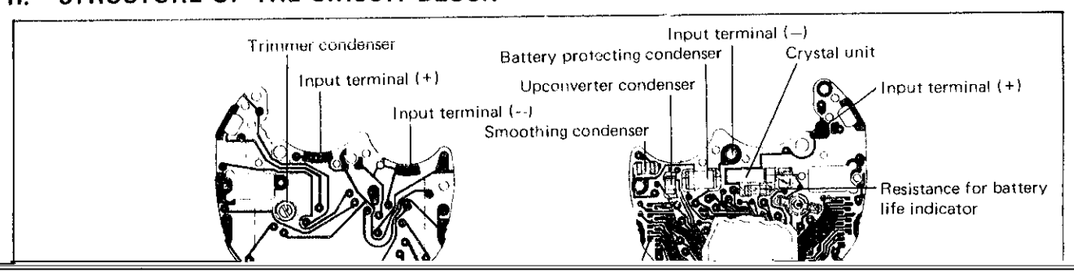
IV. CHECKING AND ADJUSTMENT ..... 6

- Check battery voltage ..... 6
- Check battery conductivity ..... 6
- Check output signal ..... 6
- Check conductivity of liquid crystal panel, circuit block, coil block and connectors ..... 6
- Check circuit block and liquid crystal panel ..... 6
- Check coil block ..... 7
- Check current consumption ..... 8
- Check speaker block ..... 9
- Check conductivity of switch components ..... 9
- Check accuracy ..... 9
- Check functioning and adjustment ..... 10

## I. SPECIFICATIONS

| Item | | Cal. No. H239A |
|---|---|---|
| Analogue Function | Time indication | Two-hand time indication (Hour and minute) |
| | Additional mechanism | Automatic electronic-hand setting by crown |
| Digital Function | Digital display | Nematic Liquid Crystal, FEM (Field Effect Mode) |
| | Liquid crystal driving system | Multiplex driving system |
| | Display system | • Home time function<br>• Calendar function<br>• Alarm function<br>• Local time function<br>• Stopwatch function |
| | Additional mechanism | • Alarm test system<br>• Time signal<br>• Battery life indicator |
| Loss/gain | | Loss gain at normal temperature range<br>Monthly rate: less than 10 seconds<br>(Annual rate: less than 2 minutes) |
| Outside diameter | | $\phi$ 30.0 mm |
| Height | | 3.1 mm without battery |
| Regulation system | | Trimmer condenser |
| Measuring gate by Quartz Tester | | Any gate is available. (Measure at the analogue function.) |
| Battery | | U.C.C. 389, Maxell SR1130W, Toshiba WG-10 or Toshiba SR1130W.<br>Battery life is approximately 3 years.<br>Voltage: 1.55V |
| Jewels | | 2 jewels |

## II. STRUCTURE OF THE CIRCUIT BLOCK



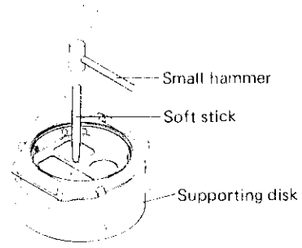

## III. DISASSEMBLING, REASSEMBLING AND LUBRICATING

1. Disassembling and reassembling of the case
   Disassembling procedures Figs.: ④ – ①
   Reassembling procedures Figs.: ① – ④

Ex.) In the case of the model which is provided with a water-resistant cap.

**Note:** • Be sure to replace the water-resistant cap with a new one when replace the glass.
• It is possible to use the speaker pipe continually when replacing the glass.

• How to disassemble the glass
Put a soft stick against the surface of the glass from inside the casebezel as shown in the illustration below and disassemble the glass by hitting on the top of the soft stick with the small hammer.



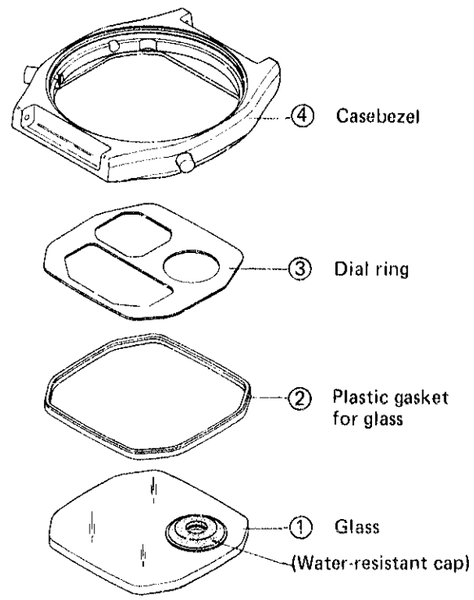

**Note:** Be careful not to push the dial ring and the water-resistant cap.

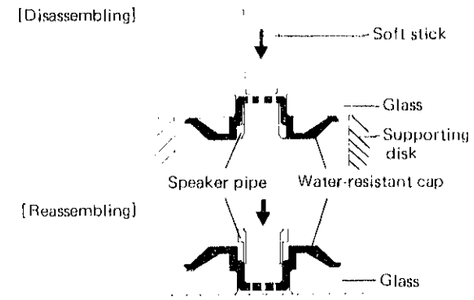
• Disassembling and reassembling of the water-resistant cap
How to disassemble
Support the glass by the supporting disk with an inside diameter which permits to support it without touching the water-resistant cap and disassemble the water-resistant cap by pushing it from outside surface of the glass with the soft stick.
How to reassemble
Place the glass on a level plate with its inside surface up and after setting the water-resistant cap in position, push the speaker pipe in.

**Note:** When reassemble the speaker pipe, be sure to push it in horizontally.

Ex.) In the case of the model which is not provided with a water-resistant cap.

The disassembling and reassembling of the glass is the same as that of mentioned above, but be sure that the dial ring is set to the casebezel correctly before setting the glass. In case the dial ring is protruding out of the inside of the casebezel, adhere the dial ring and the casebezel together with the SEIKO ad-

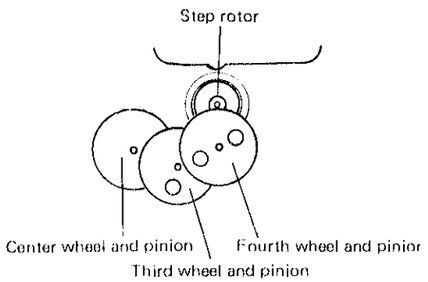


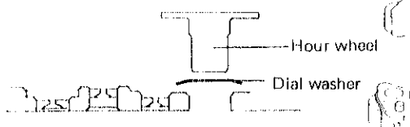

• The places for applying adhesive.
Apply the adhesive to the 6 o'clock and 12 o'clock position of back side of the dial ring.

## 4. Gear train and switch mechanism

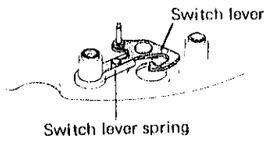
• Setting position of the gear train

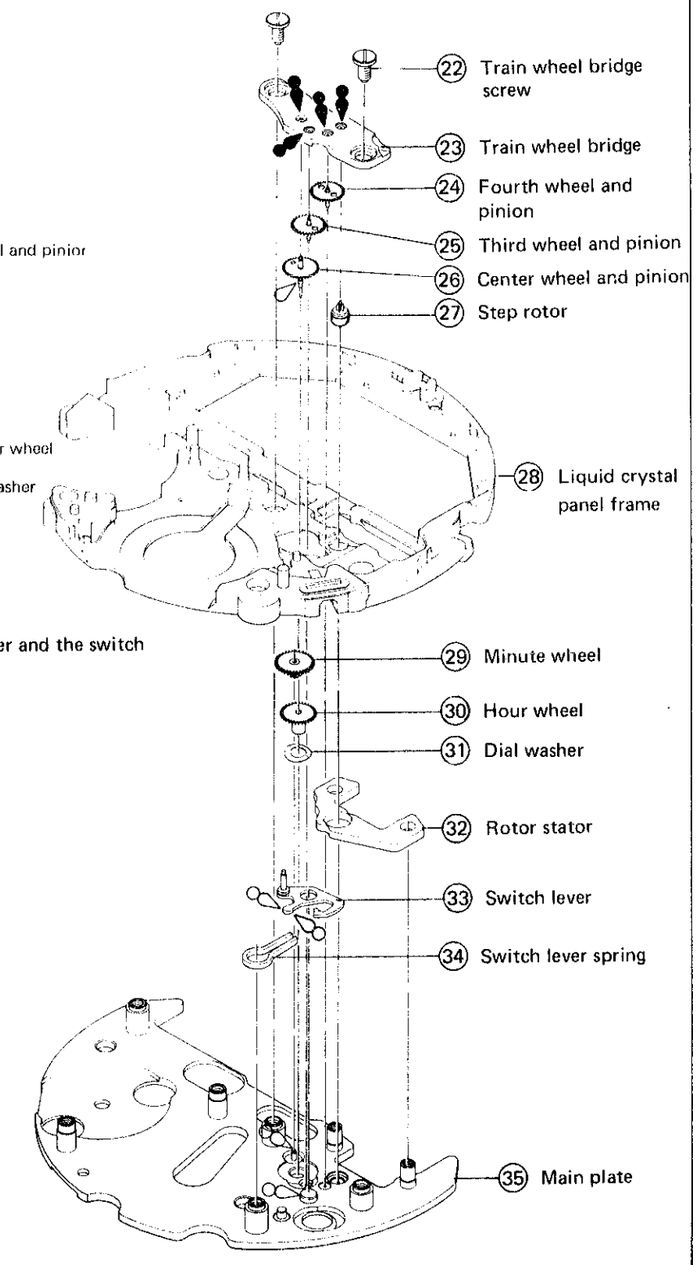



• Setting position of the dial washer




• How to reassemble the switch lever and the switch lever spring






## IV. CHECKING AND ADJUSTMENT

• Refer to the "SEIKO QUARTZ TECHNICAL GUIDE, GENERAL INSTRUCTION" for Digital Watches for details.

**Procedures**

**CHECK BATTERY VOLTAGE**

**Result:**
More than 1.5V: Normal
Less than 1.5V: Defective

**CHECK BATTERY CONDUCTIVITY**

**CHECK OUTPUT SIGNAL**

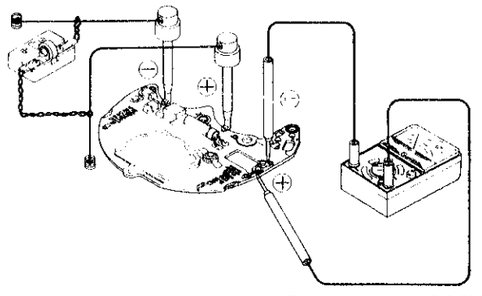
Be sure to check the output signal with the Quartz Tester set under the crown.

**Result:**
Output signal is transmitted: Normal
Output signal is not transmitted: Defective

**CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK, COIL BLOCK AND CONNECTORS**

**CHECK CIRCUIT BLOCK AND LIQUID CRYSTAL PANEL**

Output of analogue function

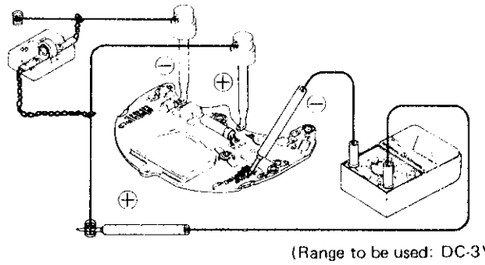



(Range to be used: DC-3V)

**Result:**
Pointer of the Volt-ohm-meter swings every 10 seconds: Normal
Pointer of the Volt-ohm-meter does not swing every 10 seconds: Defective
* Replace the circuit block with a new one.

**Note:** The output can also be checked at range: DC – 12μA.

Output of digital function




(Range to be used: DC-3V)

At the rate, the pointer of the Volt-ohm-meter swings slightly every 2 seconds on detection of the pulse for measuring the daily rate. Check to see if the pointer of the Volt-ohm-meter swings greatly every 10 seconds.

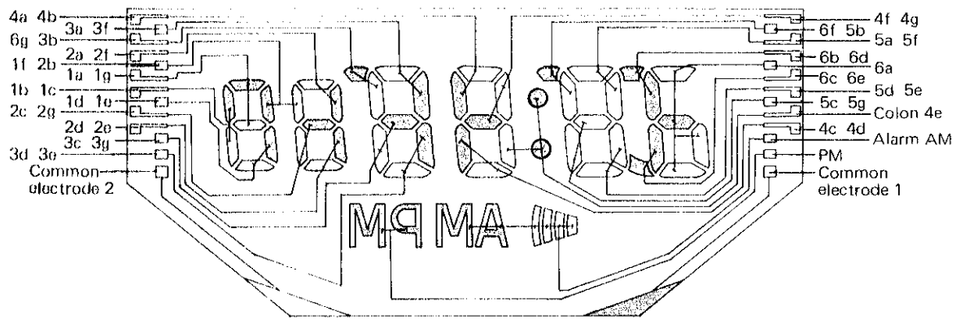
**Result:**
More than 0.8V: Normal
Less than 0.8V: Defective
* Replace the circuit block with a new one.

- Check to see if there are any broken wire, short circuit, etc. in the liquid crystal panel.

**Result:**
Lights up: Normal
Does not light up: Defective
* Replace the liquid crystal panel with a new one.

Liquid crystal panel electrode

Common electrode 1 is connected electrically with segment.
Common electrode 2 is connected electrically with segment.



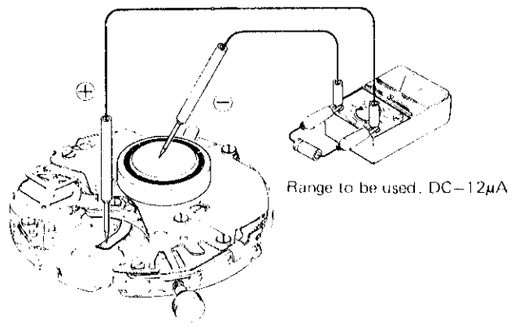

## CHECK COIL BLOCK

**Result:**
2.2kΩ – 2.6kΩ: Normal
Less than 2.2kΩ (Short circuit) / More than 2.6kΩ (Broken wire): Defective
* Replace the coil block with a new one.





## CHECK CURRENT CONSUMPTION




**Result:**
Less than 2.0μA: Normal
More than 2.0μA: Defective

- When the probe (+) of the Volt-ohm-meter is applied as shown in the illustration above, the pointer of the Volt-ohm-meter swings slightly, indicating that the current is flowing through the IC (including the liquid crystal panel). And also the Volt-ohm-meter swings greatly once every 10 seconds, since more current flows to drive the step motor in addition to the current running through the IC (including the liquid crystal panel).
- Calculate the current consumption as follows:

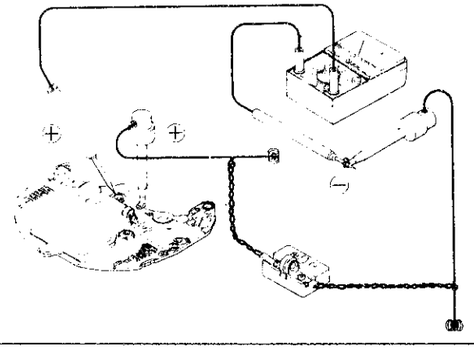
Ex.) Suppose that IC current = 1.5μA, IC current + step motor driving current = 1.8μA, then the current only for driving the step motor is 0.3μA. However, it is the value at 10-second stepping. Therefore, it is required to convert 0.3μA into the value at 1-second stepping. Reduce the value (0.3μA) into 1/10, and the current consumption only for the step motor is 0.03μA. Accordingly the current consumption for this watch is calculated As: 1.5μA + 0.03μA = 1.53μA.

* How to check if the liquid crystal panel or the circuit block is defective when the current consumption is more than 2.0μA.

[1] Check the current consumption with the coil block disassembled from the movement.

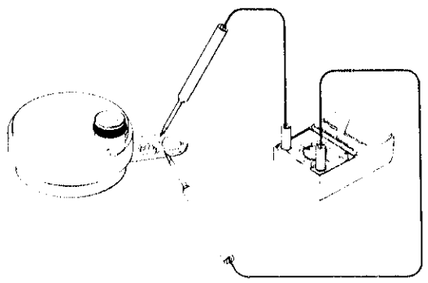
**Result:**
Less than 1.8μA: Normal
Check to see if the gear train and the step motor are set correctly and if there are dust, lint, etc.
More than 1.8μA: Defective
Proceed to [2]

[2] Check the current consumption with the circuit block alone.




**Result:**
Less than 1.5μA: Normal
Replace the liquid crystal panel.
More than 1.5μA: Defective
Replace the circuit block.

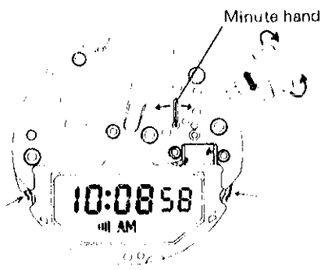
## CHECK SPEAKER BLOCK



- Check with the speaker block turned over.

**Result:**
120Ω – 140Ω: Normal
Less than 120Ω (Short circuit) } Defective
More than 140Ω (Broken wire) }
Replace the speaker block with a new one.

## CHECK CONDUCTIVITY OF SWITCH COMPONENTS




* Check after reassembling the battery and the minute hand to the movement (module).

(Digital function)
Check it by pushing the switch spring with tweezers.

**Result:**
Functions correctly: Normal
Does not function correctly: Defective
* If it can not be corrected, replace the switch spring with a new one.

(Analogue function)
Pull out the crown and turn it clockwise and counterclockwise.

**Result:**
When turned, it clicks and the hand moves: Normal
When turned, it does not click and the hand does not move: Defective
* Check switch lever and switch spring.
* Check contact point lever and friction washer for contact point lever.
* Check dust and contamination on the circuit block.

## CHECK ACCURACY

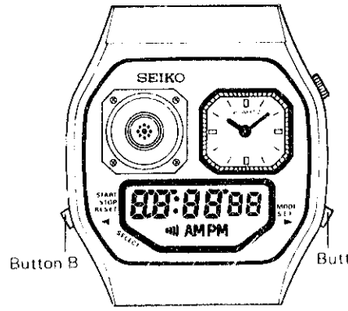
* Check accuracy according to the accuracy measuring method for analogue quartz watches. (When accuracy is measured by the accuracy measuring method for digital quartz watches, it cannot be checked stably.)
* Check accuracy with the crown side down.





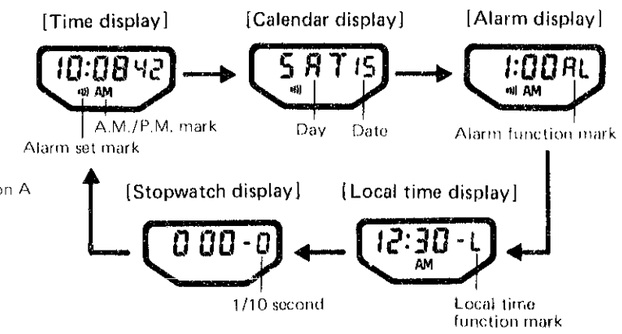
## CHECK FUNCTIONING AND ADJUSTMENT

Check the digital function




**Result:**

- Check to see if the display changes in the following order by each depression of the button A.




- Check to see if when the button B is depressed for 3 to 4 seconds in each display except in the stopwatch display a part of the display starts flashing with chime and if the flashing part changes by each depression of the button B.
- Check to see if the digit or the day advances one by one at the flashing display by each depression of the button A.

Check the analogue function.

**Result:**

- Check to see if one hour is adjusted when the crown is turned clockwise or counterclockwise 2 clicks within 1/2 second with the crown at the first click position.
- Check to see if 30 seconds is adjusted when the crown is turned clockwise or counterclockwise 1 click with the crown at the first click position.

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