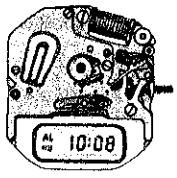
SEIKO

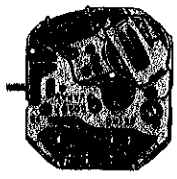
QUARTZ

Cal. E029A

PARTS CATALOGUE

Cal. E029A





125 302

231 302

☆241 304

261 260

☆270 304

☆271 262

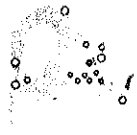
281 302

282 302

☆351 302

383 302

384 302



386 302

391 302

426 302

491 141

493 260

701 140

4001 310

4002 302

4146 302

4216 305

4225 302

4238 302

4239 302

4245 302

4246 302

4247 302

4270 302

4282 302

4313 302

4398 308

4450 302

4456 302

4457 302

☆4510 151

☆SEIKO TR726W

012 198

012 793

017 621

017 622

017 623

017 624

017 625

017 626

2/1

☆⇨Please see remarks on the next reverse page.

Cal. E029A

Characteristics

Casing diameter : 19.2 × 17.4 mm
Maximum height : 2.9 mm without battery
Jewels : 2 j
Frequency of quartz crystal oscillator : 32,768 Hz (Hz=Hertz . . . . . Cycles per second)
Time display : Digital Display System showing hour, minute, second, month, date and day of the week.
Alarm display : Can be set to operate at any desired hour and minute.
Display medium : Nematic Liquid Crystal, FE-Mode.
Driving system : Step motor (2 poles)
Regulation system : Trimmer condenser
Train wheel setting
Battery life indicator : All the digits in the display begin flashing.

PART NO.	PART NAME
125 302	Train wheel bridge
231 302	Third wheel & pinion
☆241 299	Fourth wheel & pinion
☆**241 304**	
☆241 305	
261 260	Minute wheel
☆270 303	Center minute wheel with cannon pinion
☆**270 304**	
☆270 305	
☆**271 262**	Hour wheel
☆271 266	
☆271 303	
281 302	Setting wheel
282 302	Clutch wheel
☆**351 302**	Winding stem
383 302	Setting lever
384 302	Yoke (Clutch lever)
386 302	Setting lever spring
391 302	Train wheel setting lever
426 302	Train wheel bridge support
491 141	Dial washer
493 260	Hour wheel ring (Thickness 0.03 mm, Gold)
493 261	Hour wheel ring (Thickness 0.05 mm, Silver)
493 262	Hour wheel ring (Thickness 0.07 mm, Gold)
701 140	Fifth wheel & pinion
4001 310	Circuit block
4002 302	Coil block
4146 302	Step rotor
4216 305	Insulator for circuit
4225 302	Battery clamp
4238 302	Switch lever spring
4239 302	Rotor stator
4245 302	Changeover switch spring
4246 302	Speaker lead terminal
4247 302	Switch lever bush
4270 302	Battery connection (−)
4282 302	Contact point lever
4313 302	Connector
4398 308	Liquid crystal panel frame
4450 302	Switch lever
4456 302	Switch lever cover
4457 302	Circuit block cover
☆**4510 151**	Liquid crystal panel (Silver)
☆4510 152	Liquid crystal panel (Gold)

PART NO.	PART NAME
011 541	Upper hole jewel for step rotor
011 541	Lower hole jewel for step rotor
012 198	Train wheel bridge screw
012 198	Circuit block screw
012 198	Coil block screw
012 793	Setting lever spring screw
017 621	Tube for train wheel bridge (A)
017 622	Tube for train wheel bridge (B)
017 623	Tube for circuit block screw (A)
017 624	Tube for coil block screw
017 625	Tube for circuit block screw (B)
017 626	Tube for circuit block screw (C)
☆SEIKO TR726W	Silver (II) oxide battery
☆ Maxell SR726W	Silver oxide battery

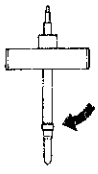
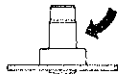
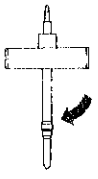
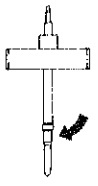
☆ ⇨ Please see remarks on the reverse page.
Part numbers in light letters are not shown in photos.

Cal. E029A

Remarks :

Fourth wheel & pinion, Center minute wheel with cannon pinion, Hour wheel

There are three different types as specified below.
Combination :

Type	Fourth wheel & pinion	Center minute wheel with cannon pinion	Hour wheel
a	 ☆241 304	 ☆270 304	Silver  ☆271 262
*b	 ☆241 305	 ☆270 305	Gold  ☆271 266
c	 ☆241 299	 ☆270 303	Silver  ☆271 303

* As of this printing the Type b combination is not used. However it may be employed in the future with certain case designs.

Winding stem

☆351 302 ····· There are several types of winding stem. The size of winding stem is determined based on the design of cases. If the combination of the winding stem and case is unkown, check the case number and refer to **"SEIKO Quartz Casing Parts Catalogue"** to choose a corresponding winding stem.

Liquid crystal panel

☆4510 151 }
☆4510 152 } ..... Be sure that the combination between the color of panel cover and liquid crystal panel should be matched according to the **"SEIKO Quartz Casing Parts Catalogue"**.

Battery

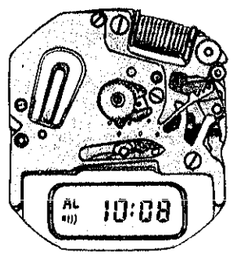
☆SEIKO TR726W }
☆Maxell SR726W } ..... The substitutive battery might be added to the applied battery in the future. In that case, please refer to separate **"BATTERY LIST FOR SEIKO QUARTZ WATCHES"**.
Note that SEIKO battery is marked with "SEIZAIKEN" on its (+) side.

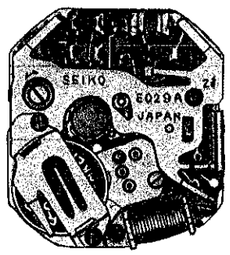
TECHNICAL GUIDE

SEIKO

DIGITAL QUARTZ

CAL. E029A



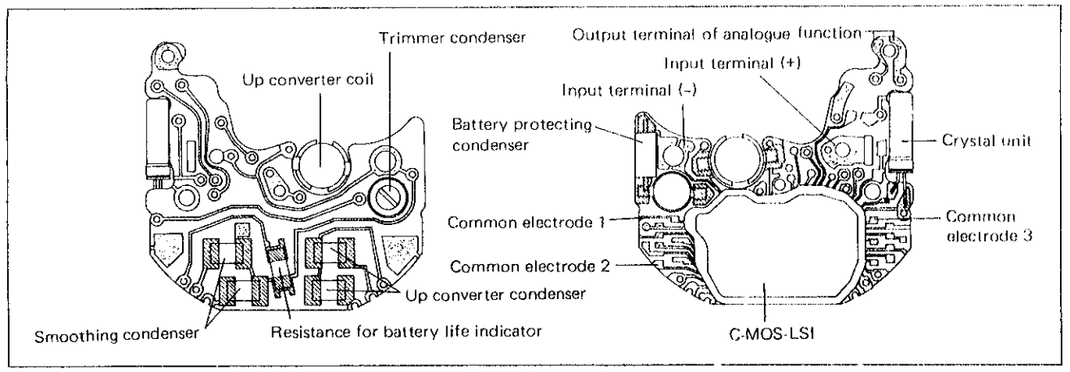


CONTENTS

I. SPECIFICATIONS

Item		Cal. No. E029A
Analogue function	Time indication	Three-hand
	Additional mechanism	• Train wheel setting device • Electronic circuit reset switch
Digital function	Display medium	Nematic Liquid Crystal, FEM (Field Effect Mode)
	Liquid crystal driving system	Multiplex driving system
	Display system	• Time display • Second display • Day and date display • Month and date display • Alarm display
	Additional mechanism	• Alarm test system • Battery life indicator
Loss/gain		Loss/gajn at normal temperature range Monthly rate: less than 15 seconds (Annual rate : less than 3 minutes)
Casing diameter		ϕ 21.0 mm (19.2 mm between 6 o'clock and 12 o'clock sides: 17.4 mm between 3 o'clock and 9 o'clock sides:)
Height		2.9 mm without battery
Regulation system		Trimmer condenser
Measuring gate by Quartz Tester		Any gate is available.
Battery		Silver oxide battery Battery life is approximately 2 years for SEIKO (SEIZAIKEN) TR726W, and 1 year for Maxell SR726W. Voltage: 1.55 V
Jewels		2 jewels

II. STRUCTURE OF THE CIRCUIT BLOCK



III. DISASSEMBLING, REASSEMBLING AND LUBRICATING

- **Disassembling and reassembling**

  Disassembling procedures Figs. : ① – ㊺

  Reassembling procedures Figs. : ㊺ – ①

- **Lubricating**

  Types of oil
  Moebius A
  SEIKO Watch Oil S-6

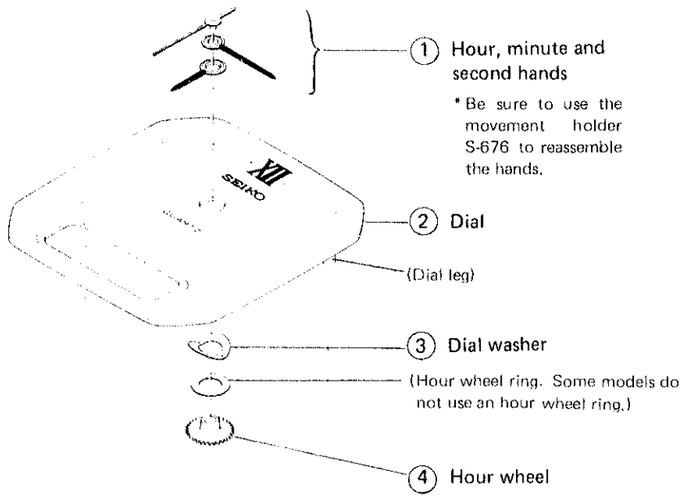
  Oil quantity
  Normal

- Be sure to use the movement holder S-676

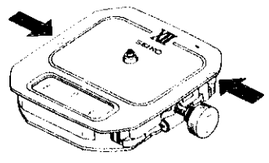
- List of used screw

Shape	Parts No.	Name	Shape	Parts No.	Name
	012 198	Train wheel bridge screw (2 pcs.) Circuit block screw (3 pcs.) Coil block screw (1 pc.)		012 793	Setting lever spring screw (4 pcs.)

1. Indicating mechanism

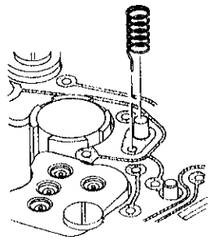


Dial
The dial is fixed by putting the dial leg into the hole on the liquid crystal panel frame.
When disassembling the dial, insert the tip of the screwdriver in the arrowmark-portioned notches of the illustration on the right and pry it up alternately.
When reassembling the dial, set it evenly.

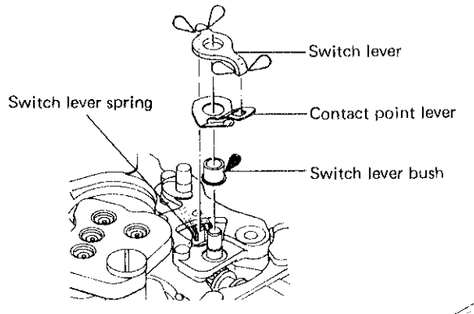


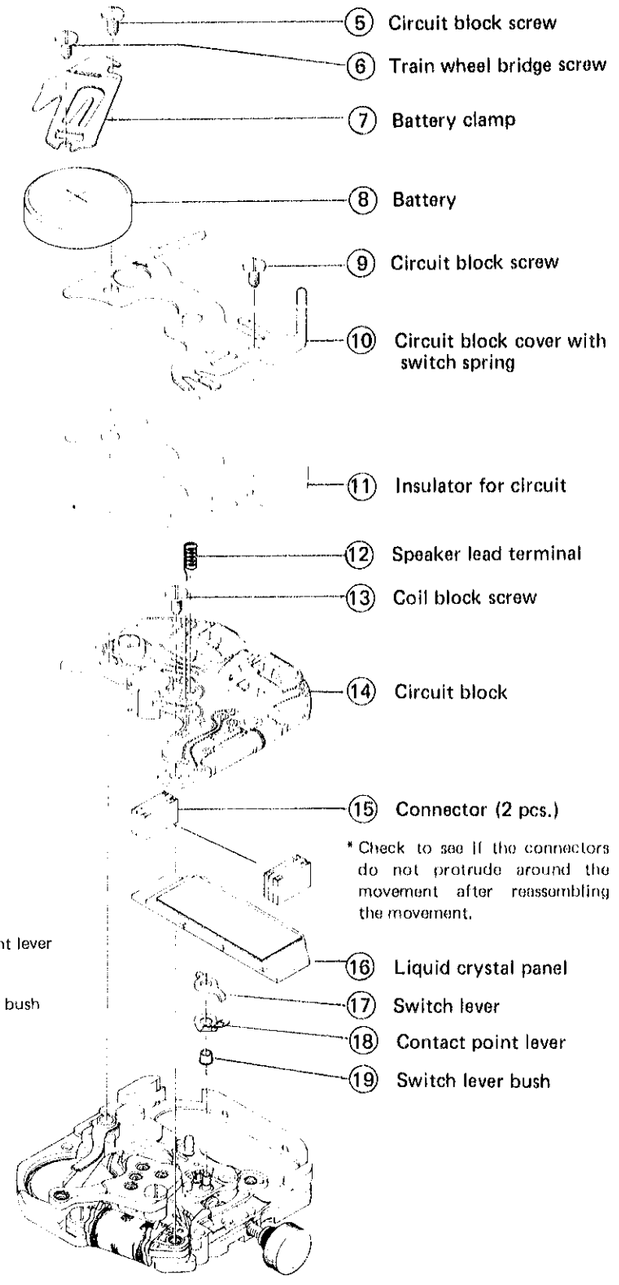
2. Electronic circuit and switch mechanism

⑫ Speaker lead terminal
Set the speaker lead terminal as shown in the illustration below.



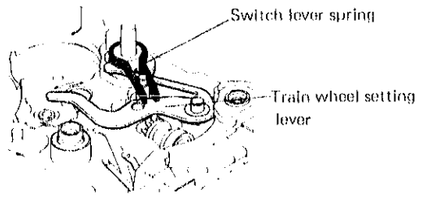
- How to reassemble the switch mechanism
  Set one end of the switch lever to the smaller opening of contact point lever and the other end to the open end of switch lever spring.





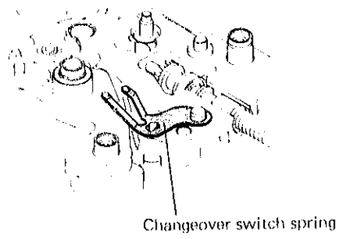
3. Gear train mechanism

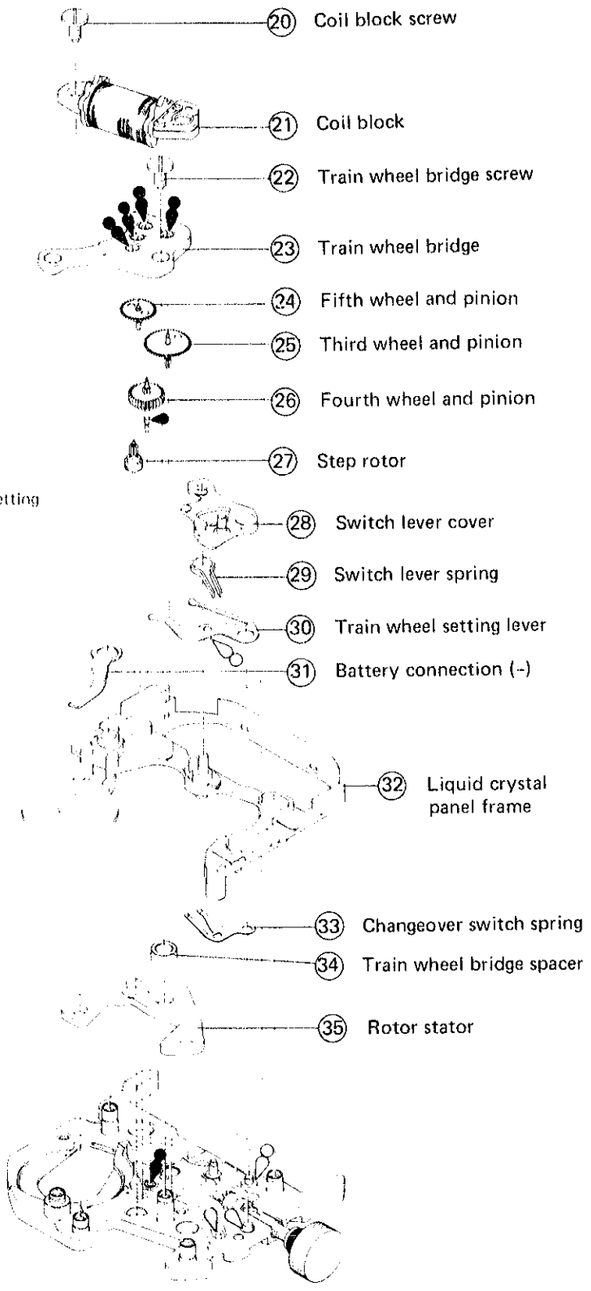
- Switch lever spring and train wheel setting lever



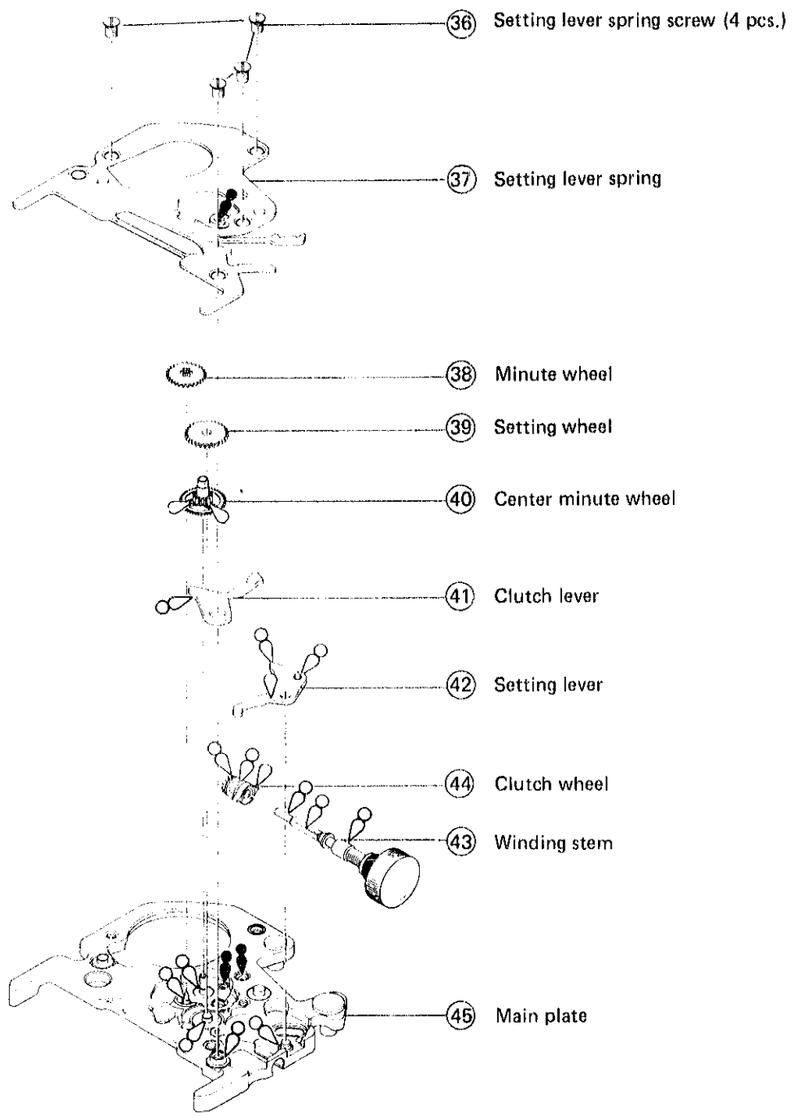
* Reassemble the train wheel setting lever while pulling out the crown completely. After reassembling it, push the crown back to the normal position.

- Changeover switch spring





4. Setting mechanism



IV. CHECKING AND ADJUSTMENT

- Refer to the "SEIKO QUARTZ TECHNICAL GUIDE GENERAL INSTRUCTION" for Digital watches and Analogue watches for details.

Procedure

CHECK BATTERY VOLTAGE

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

CHECK BATTERY CONDUCTIVITY

CHECK OUTPUT SIGNAL

* Be sure to use an electro-magnetic microphone for checking.

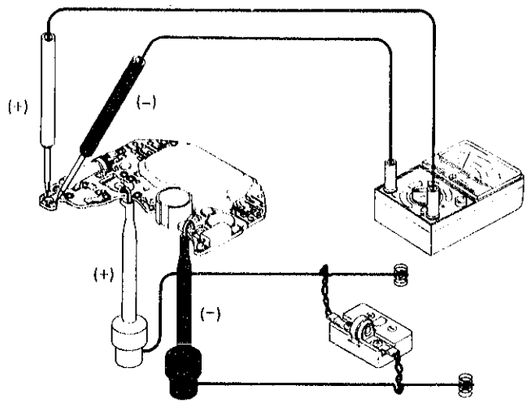
Result:
Input indicator blinks every second: Normal
Input indicator does not blink every second: Defective

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

CHECK CIRCUIT BLOCK

Output of analogue function

(Range to be used: DC-3V)

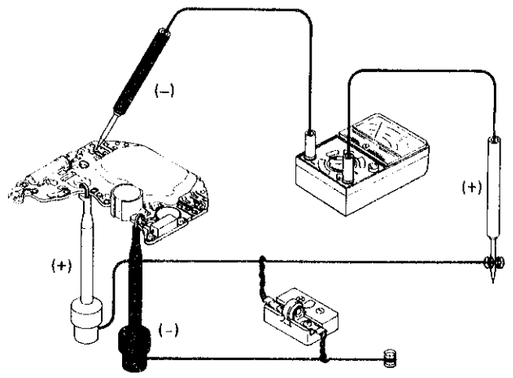


Result:
Pointer of the Volt-ohm-meter swings every second: Normal
Pointer of the Volt-ohm-meter does not swing every second: Defective
Replace the circuit block with a new one.

Procedure

Output of digital function

(Range to be used: DC-3V)



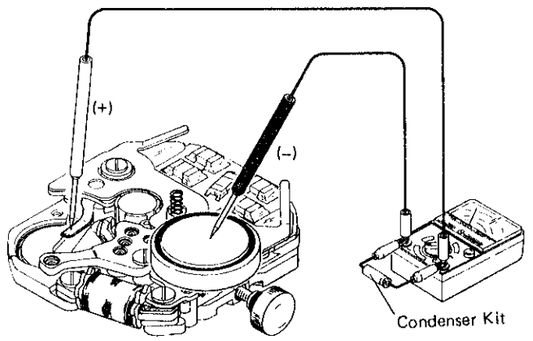
Result:
More than 0.8 V: Normal
Less than 0.8 V : Defective
Replace the circuit block with a new one.

CHECK COIL BLOCK

Result:
3.2 KΩ ~ 3.8 KΩ: Normal
Less than 3.2 KΩ (Short circuit) — Defective
More than 3.8 KΩ (Broken wire) — Defective
Replace the coil block with a new one.

CHECK CURRENT CONSUMPTION

(Range to be used: DC-12 μA)



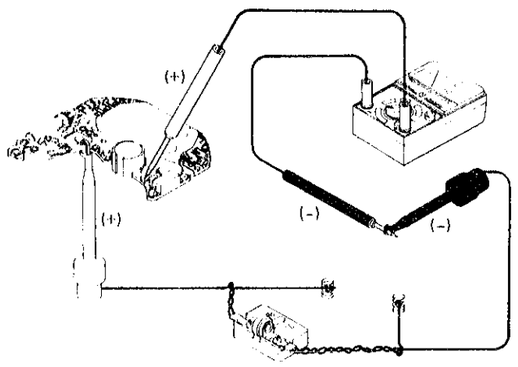
Result:
Less than 1.8μA: Normal
More than 1.8μA: Defective

* How to find defects when the current consumption is more than 1.8μA

[1] Check the current consumption of the movement without the coil block.

Result:
Less than 1.5μA
Check to see if the gear train and the step motor are set correctly and if there are dust, lint, etc.

More than 1.5μA
Proceed to [2]



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

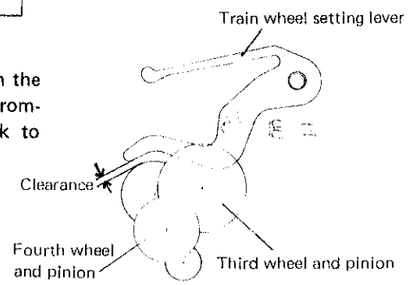
Result:
Less than 1.2μA -- Circuit block: Normal
Replace the liquid crystal panel with a new one.

More than 1.2μA--Circuit block: Defective
Replace the circuit block with a new one.

CHECK RESET AND TRAIN WHEEL SETTING CONDITION

- Reset condition
  Check to see if the second hand stops immediately when the crown is pulled out to the second click and if it starts promptly after one second when the crown is pushed back to the first or the normal position.

(Reset condition can also be confirmed by the procedure CHECK OUTPUT SIGNAL
Crown at the second click position: Does not blink every second
Crown at the normal and first click position: Blinks every second)



Result:
Stops completely and starts moving after one second: Normal
Does not stop or move irregularly: Defective
Check the changeover switch spring and train wheel setting condition.

- Train wheel setting condition
  Check to see if there is the clearance between the train wheel setting lever and the fourth wheel and pinion.

Crown at the normal and first click position

Clearance: Normal
No clearance: Defective

Replace the train wheel setting lever with a new one.

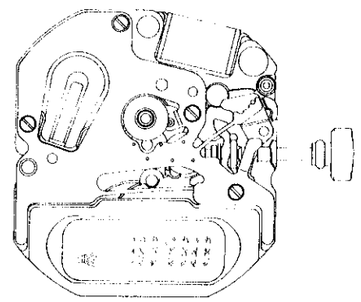
Crown at the second click position

No clearance: Normal
Clearance: Defective

Replace the train wheel setting lever with a new one.

CHECK CONDUCTIVITY OF SWITCH COMPONENTS

* Check after reassembling the battery to the movement.



(Digital function)

[1] Turn the crown counterclockwise or clockwise at the normal position.

When turned, it clicks and the display changes: Proceed to [2].

When turned, it clicks but the display does not change: — Defective

When turned, it does not click and the display does not change: — Defective

* Check setting position of switch lever and switch lever spring.
* Check setting position of contact point lever and switch lever.
* Check the contact portion of contact point lever and circuit block.

[2] Pull the crown to the first click and turn it counterclockwise or clockwise in each display.

The digits advance when the crown is turned counterclockwise and they go back when the crown is turned clockwise: Normal

The digits do not advance or go back when the crown is turned counterclockwise or clockwise: Defective

* Check the contact portion of changeover switch spring and circuit block.
* Check setting position of changeover switch spring.

CHECK ACCURACY

- Check accuracy according to the accuracy measuring method for the analogue quartz watches. (When accuracy is measured by the accuracy measuring method for the digital quartz watches, it can not be checked stably.)
- Check accuracy with the crown side up.

CHECK ALARM TEST SYSTEM

- In the time display, turn the crown in the following order within 2.5 seconds and the alarm will ring.
  Clockwise → Counterclockwise → Clockwise → Counterclockwise

Result:
The alarm rings: Normal
The alarm does not ring: Defective
Check the speaker.

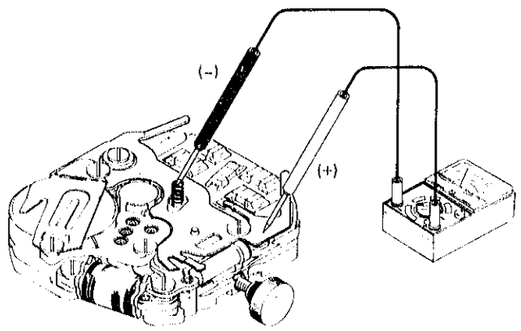
CHECK SPEAKER

When the alarm does not ring, check the following things.

- Check output voltage for alarm.
  In the time display, turn the crown in the following order, clockwise → counterclockwise → clockwise → counterclowise and check the speaker output as shown in the illustration below.

*Output voltage for alarm is transmitted for 10 to 20 seconds.

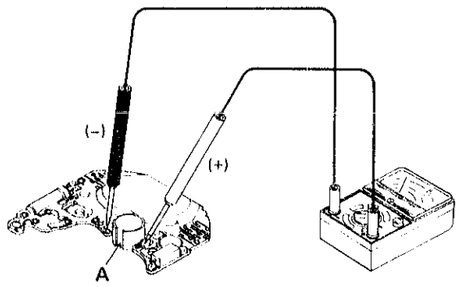
(Range to be used DC: 30 mA or DC: 3 V)



Probe red : Circuit block cover with switch spring.
Probe black : Speaker lead terminal

Result:
The pointer of the volt-ohm-meter swings: Normal
The pointer of the volt-ohm-meter does not swing: Defective
Replace the circuit block with a new one.

- Check up converter coil



Result:
60Ω ~ 100Ω : Normal
Less than 60Ω (Short circuit) ┐
More than 100Ω (Broken wire) ┘ Defective
Replace the circuit block with a new one.

- In case the color of portion A (arrow marked) is red.

Result:
130Ω ~ 170Ω : Normal
Less than 130Ω (short circuit) ┐
More than 170Ω (Broken wire) ┘ Defective
Replace the circuit block with a new one.

- Check piezoelectric element
  When there is no defective found through the checking above, proceed to the checking of piezoelectric element.

CHECK WATER RESISTANCE

CHECK FUNCTIONING AND ADJUSTMENT

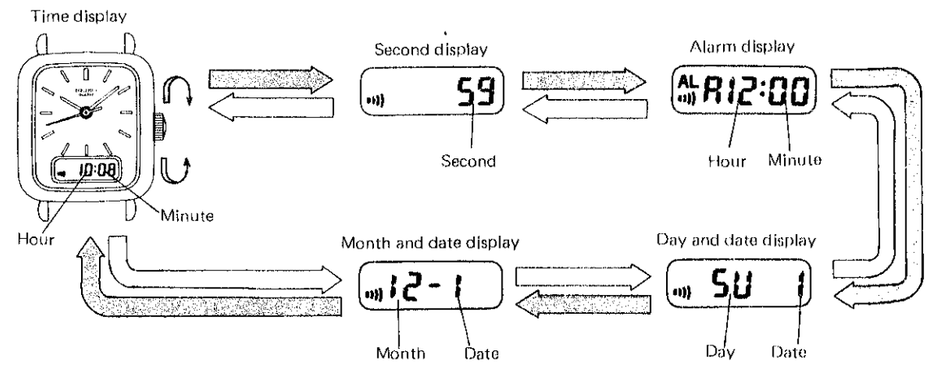
[Check the analogue function]

- Check to see if the second hand stops completely when the crown is pulled out to the second click and if time adjustment can be set.

* In any digital display, analogue function can be adjusted when the crown is pulled out to the second click.

[Check the digital function]

- Check to see if the display changes in the following order by turning the crown clockwise or counterclockwise.



- Check to see if the setting function is activated when the crown is pulled out to the first click in each display and if the digits to be adjusted by turning the crown.

All procedures for disassembling, reassembling, lubricating, checking and adjustment are completed.