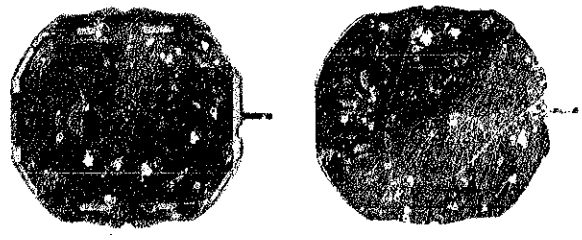
SEIKO

QUARTZ *LC*

Cal.0139A

PARTS LIST

Calibre No.	Jewels	Style Name
0139A	0j	QUARTZ LC DUAL-ZONE TIMER



Characteristics

Casing diameter: φ29.20 mm
Maximum height: 6.41 mm
Frequency of quartz crystal oscillator: 32,768 Hz
(Hz=Hertz ..... Cycle per second)
Time functions: Digital Display System showing hour, minute & second (Basic display: 12-hour indication, Zone II display: 24-hour indication)
Calendar functions: Digital Display System showing day of the week & date
Display medium: Single Crystal Display (Nematic Liquid Crystal, FE-Mode)
Time micro-adjustor: Trimmer condenser system
Illumination light for digital display panel: illuminated in accordance with the crown depressing
Battery life indicator ..... The entire display begins flashing.


283 010


353 002

354 051


383 035

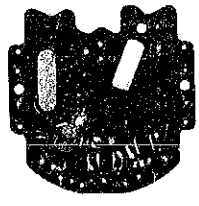

389 004


637 005

687 001


735 002


981 007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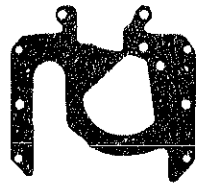

4216 028


4242 055


4242 065

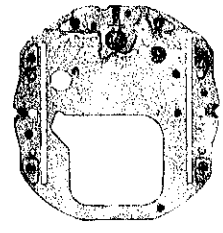
4245 015


4270 015


4299 007


4313 019


4398 017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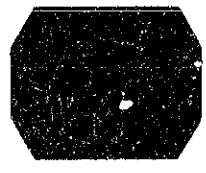
4408 015


4450 004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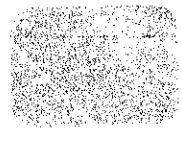
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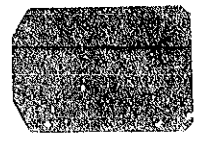
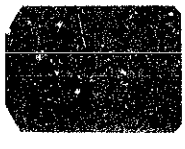
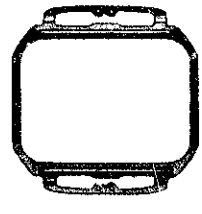

4521 009


4521 011


4530 006


4532 001


4540 002


SEIKO SB-BU


012 449


017 098

2/1

Calibre No.	Jewels	Style Name
0139A	0j	QUARTZ LC DUAL-ZONE TIMER

PART NO.	PART NAME	PART NO.	PART NAME
283 010	Digit corrector wheel		
353 002	Digit corrector rocking lever spring		
354 051	Digit adjusting stem		
383 035	Setting lever		
389 004	Setting lever holder		
637 005	Stem setting spring		
687 001	Contact point lever spring		
735 002	Digit adjusting stem holder		
981 007	Digit corrector rocking lever		
4001 061	Circuit block		
4216 028	Insulator for circuit		
4242 055	Plus terminal of battery connection(A)		
4242 065	Plus terminal of battery connection(B)		
4245 015	Switch spring		
4270 015	Battery connection		
4299 007	Lower plate for switch components		
4313 019	Connector		
4398 017	Battery guard		
4398 028	Liquid crystal panel frame		
4408 015	Bulb holder		
4450 004	Switch lever		
4510 301	Liquid crystal panel		
4511 003	Filter		
4521 009	Reflecting mirror (Silver)		
4521 011	Reflecting mirror (Brown)		
4530 006	Bulb		
4532 001	Bulb holder cover		
4540 002	Spring for liquid crystal panel		
012 449	Setting lever holder screw		
012 449	Bulb holder cover screw		
012 449	Screw for plus terminal of battery connection		
012 449	Screw for battery connection		
017 098	Tube for battery connection screw		
SEIKO SB-BU	Silver oxide battery		

TECHNICAL GUIDE

SEIKO

DIGITAL QUARTZ

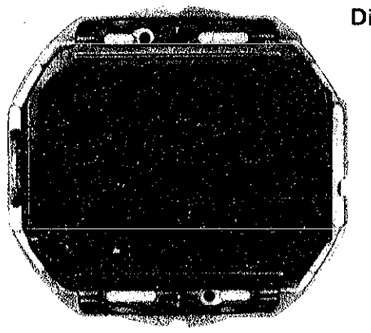
CAL.0139A

CONTENTS

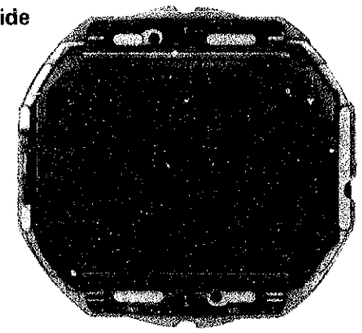
Calibre 0139A

Movement

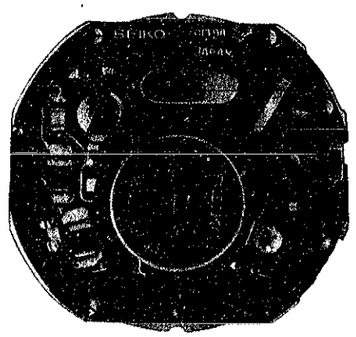
Display panel side



Basic Display



Zone II Display



Case back side

I. SPECIFICATIONS AND FEATURES

1. Specifications

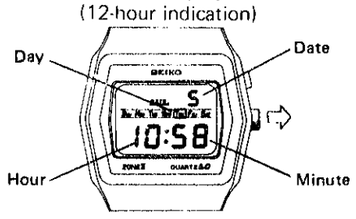
Item \ Calibre No.	0139A
Display medium	Single Crystal Display (Nematic Liquid Crystal, FEM (Field Effect Mode))
Display system	12-hour and 24-hour indication—adopting two-way changeover system as Dual Zone Time Hour/Minute: Basic Display . . . . . 12-hour Indication Zone II Display . . . . . 24-hour Indication (Mode can be changed by pushing in the side button.) Second: 60-second Indication Calendar function: Day of the week . . . Indicated by a moving frame Date . . . 31-day Indication (In the months with 30 days or less, an adjustment is necessary.)
Additional mechanism	Battery life indicator; Illumination light
Crystal oscillator	32,768 Hz (Hz = Hertz . . . cycle per second)
Loss/gain	Loss/gain at normal temperature range Mean monthly rate: less than 15 seconds Annual rate: less than 3 minutes
Casing diameter	ϕ 29.2 mm (28.5 mm between 3 o'clock and 9 o'clock side)
Height	6.4 mm
Operational temperature range	$-10^{\circ}C \sim +60^{\circ}C$ ($14^{\circ}F \sim 140^{\circ}F$)
Regulation system	Trimmer condenser
Battery power	Battery life is over one year. (If the light is used ten times each day for one second at a time.) SEIKO SB-BU silver oxide battery
IC (Integrated Circuit)	C-MOS-LSI . . . 1 piece

2. Features

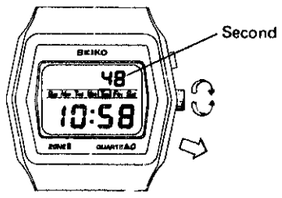
Cal. 0139 is a dual zone timer and the Basic Display (12-hour indication) and the Zone II Display (24-hour indication) can be changed from one to the other by simply pushing in the side button (changeover switch button).
Each time and calendar display (hour, minute, date and day of the week) functions independently of each another except the second display of both functions which is the same for both the Basic Display and the Zone II Display.

3. Display

Basic Display
(12-hour indication)

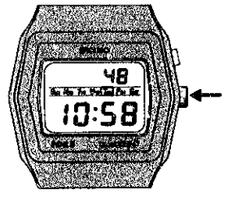


Crown: Normal position



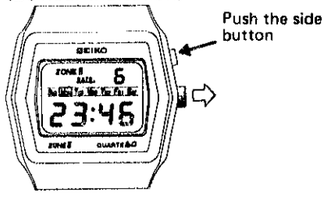
Date/Second
Date and second can be changed by turning the crown either clockwise or counterclockwise.

Push the crown

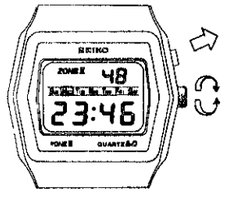


Light is lit

Zone II Display
(24-hour indication)



Crown: Normal position



Each time and calendar display in the Basic Display and the Zone II Display can be independently adjusted except the second digits.

4. Display adjustment

Pull the crown out and turn it clockwise to select the digits and day indicator to be adjusted and turn it counterclockwise to adjust the digits and day indicator. Adjustment is made in the following order

→Date→Day→Hour→Minute→

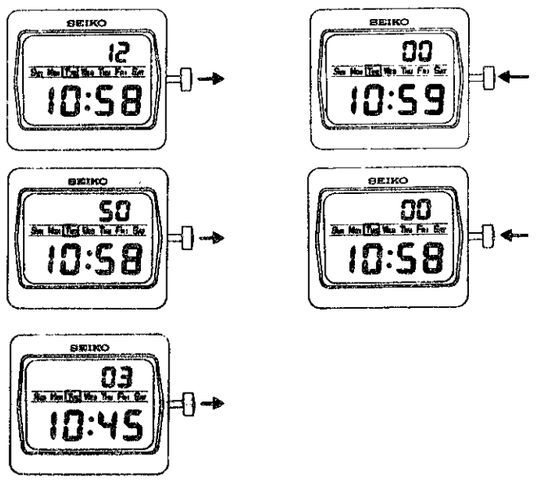
(The adjustment procedure is the same for both Basic display and Zone II display.)

Set the time shown below for example by following the procedures below.

Example: (In case of Basic Display)
How to change the indication of 10:45:50 AM of the 29th, Tuesday into 1:05:00 PM of the 10th, Thursday.
Be sure to change the display in the following numerical order.
Set the second first.

1. How to set the second

With the crown pulled out to the first click and with all the displays being shown even if the date digits are displayed, the second digits are automatically displayed, depress the crown in. Then the second is reset to "00" (When the second counts any numbers from "00" to "29", the second is automatically reset to "00" and start immediately whenever the crown is depressed. If, however, the second counts from "30" to "59" when the crown is depressed, one minute is added and the seconds return to "00".



2. Pull out the crown again.

3. How to set the date

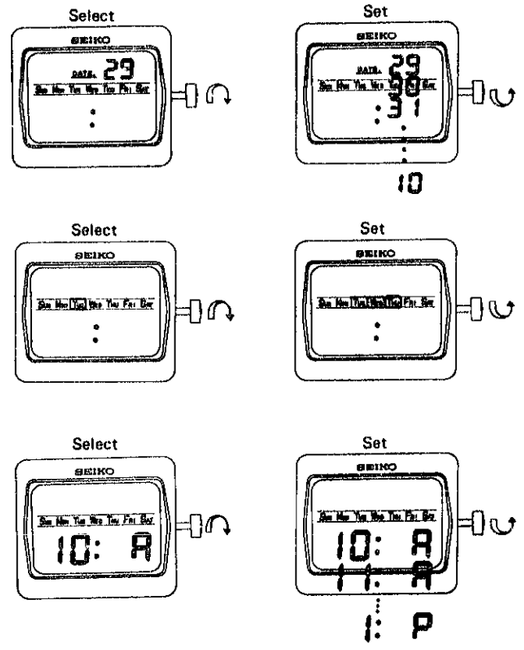
Turn the crown clockwise, and the date digits are only displayed and other display will be extinguished. If the crown is turned counterclockwise, one date is advanced by each click.

4. How to set the day

With the crown still in a pulled out position, turn the crown clockwise until a "click" is heard.
Then only the day of the week display "Tue" will be shown and the other displays will be extinguished. Turn the crown counterclockwise and indicator square frame of the day will advance by each click.

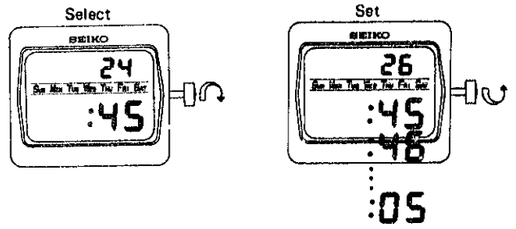
5. How to set the hour

With the crown still in a pulled out position, turn the crown clockwise, until a "click" is heard.
Then only the hour (10) and "A" (stands for AM) will be displayed and the other displays will be extinguished. Turn the crown counterclockwise and the hour will advance by each click.
While setting the hour, be sure to check if it is set in the A.M. or P.M. period. (If the Zone II Display (24-hour indication) is used, neither "A" (A.M.) nor "P" (P.M.) will be displayed.)



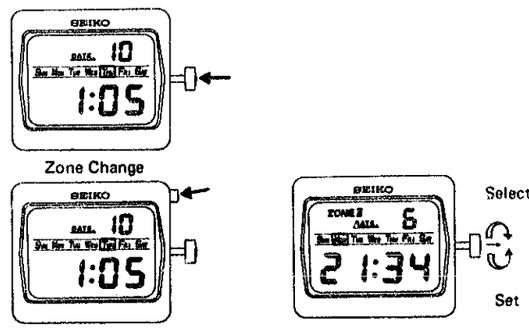
6. How to set the minute

With the crown still in a pulled out position, turn the crown clockwise until a "click" is heard. Then only the minute and second will be displayed and the other displays will be extinguished. Turn the crown counterclockwise and one minute will advance by each click. While setting the minute digits with above procedures, the minute digits do not advance although the second digits may pass the "59" seconds.



7. Push the crown in to the normal position.

After the time setting is completed, push the crown in to the normal position and all the displays will be indicated.
Adjustment of the Zone II Display (24-hour indication). Push the side button in to change the display to the Zone II Display and follow the above procedures 2 ~ 7. Even while adjusting the display, the Basic Display and the Zone II Display can either be changed from one to the other or be adjusted.



5. Battery life indicator

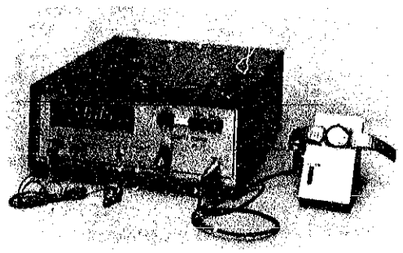
The battery needs to be replaced when you see the entire display flashing. The battery will expire in about one week from that time. The watch will, however, remain accurate while flashing.

II. AFTER-SALE SERVICING INSTRUMENTS AND MATERIALS

For after-sale servicing of SEIKO Quartz Digital Cal. 0139A, the following after-sale servicing instruments and materials are necessary.

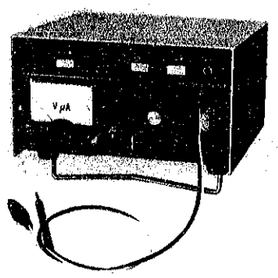
1. Quartz Tester QT-77

Used to check and adjust time accuracy.



2. MICRO TEST MT-10 II

Used to check current consumption and to flow voltage power constantly.

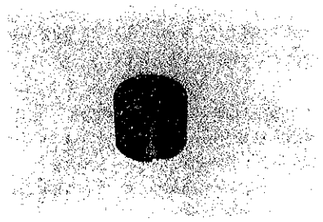


3. Volt-ohm-meter

Used to check circuit block and its conductivity, to measure current consumption, and to check battery voltage.

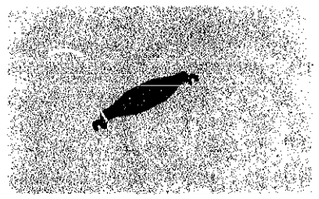
4. Movement holder S-644

Used for disassembling and reassembling of the movement.



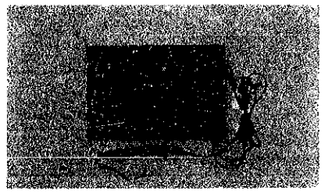
5. Battery holding spring S-812

Used for securing battery and flowing current when the movement is removed from the case.



6. Static electricity protector S-830

Used to protect the C-MOS-LSI of the circuit block of Digital Quartz from being damaged by static electricity.

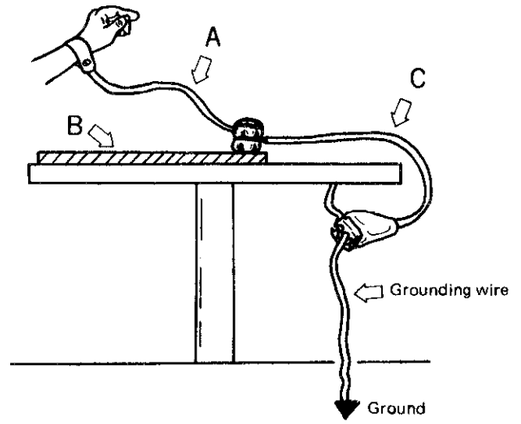


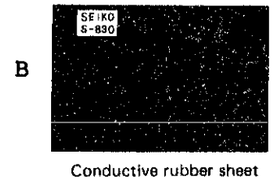
MORE DETAILED EXPLANATION FOR STATIC ELECTRICITY

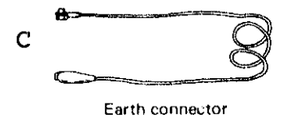
The reason of necessity:

When repairing the movement of the SEIKO Digital Quartz, be sure to use the Static Electricity Protector, S-830, in order to protect its circuit block from being damaged by static electricity.
The human body and clothes are often charged with static electricity of from several thousands to several tens of thousands of volts, depending on environmental conditions. If this high voltage static electricity flows directly through the circuit block, the C-MOS-LSI will be damaged. The Static Electricity Protector, S-830, shunts the static electricity to ground, protecting the circuit block when it is repaired.

How to use







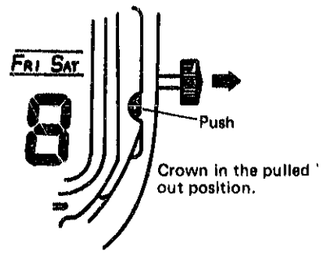
- Set up the Static Electricity Protector as illustrated above, and place the movement of the Digital Quartz Watch on the conductive rubber sheet (B) for repair. This rubber sheet is specially processed to have a conductivity for discharging static electricity.
- Put the wrist strap (A) direct around the naked skin, and not over clothing.
- Be sure to connect the earth connector (C) to the grounding wire directly connected to the ground, or connect the earth connector (C) to the grounding wire which is connected to the earth terminal at the outlet or a metallic water service pipe for the same effect.

III. DISASSEMBLING AND REASSEMBLING OF THE CASE

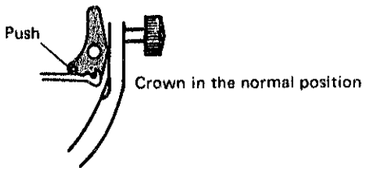
How to remove the digit adjusting stem with crown

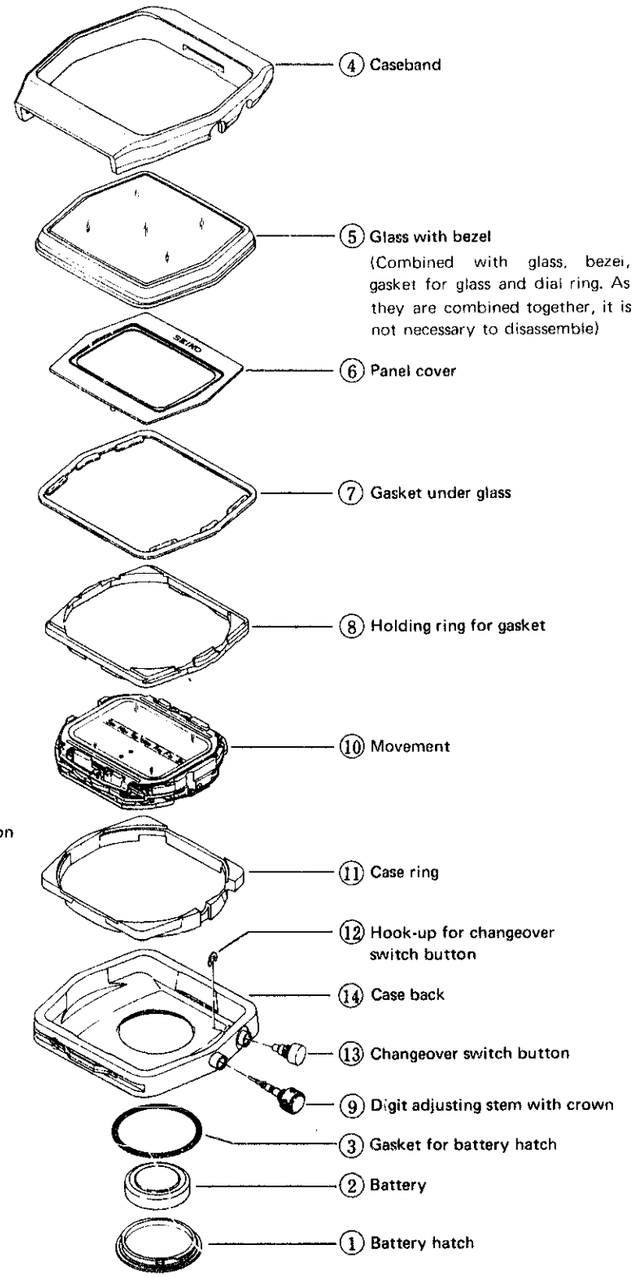
Depending on the case model to be disassembled, choose and follow one of the two disassembling procedures which are illustrated below.

- **Disassemble from the panel side.**



- **Disassemble from the battery side.**



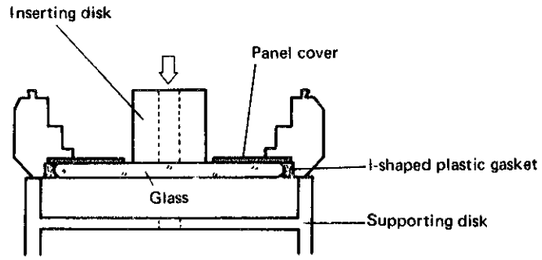


Case No. 0139–5029

The panel cover is supported by both the caseband and the glass. As the inside diameter of the panel cover is smaller than the outside diameter of the glass, follow the procedures below when the glass is removed and fixed.

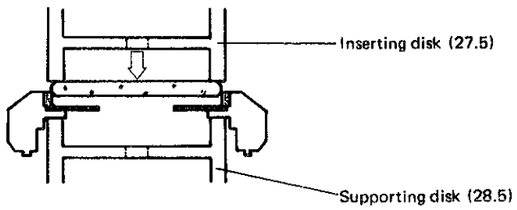
- **How to remove the glass**

Remove the glass by using the inserting disk as shown in the illustration below. Do not push the panel cover with the inserting disk or the panel cover will be damaged.



Inserting disk to be used: S-160
Inserting disk: ϕ 14.5 mm (diameter)
Supporting disk: ϕ 35.0 mm (diameter)

- **How to fix the glass**

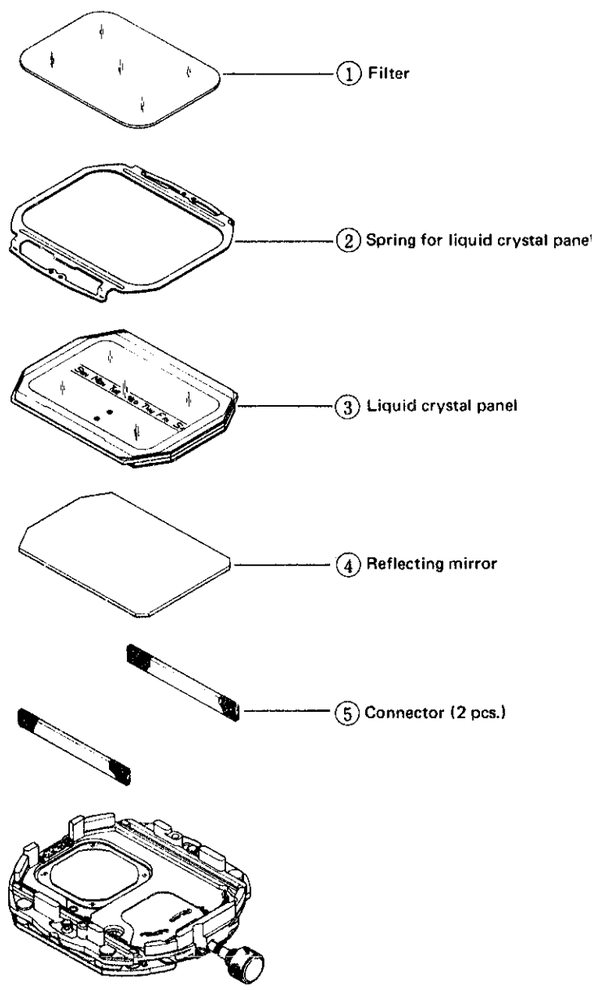


Inserting disk to be used: S-160
Inserting disk: ϕ 27.5 mm (diameter)
Supporting disk: ϕ 28.5 mm (diameter)

- There is no difference in front and back of the glass.
- After ascertaining the glass is placed on the I-shaped plastic gasket in parallel with the caseband, push the glass in the caseband.
- Do not apply silicon grease around the I-shaped plastic gasket.
- After ascertaining the upper and lower side of the gasket, push it in the caseband.
  Do not use the I-shaped plastic gasket again, which has been already used.

- Disassembling and reassembling
  Disassembling procedures Figs.: ① ~ ㉚
  Reassembling procedures Figs.: ㉚ ~ ①
- Lubricating: ●▬ SEIKO Watch Oil S-6
- Quantity of oils: ○▷ Normal quantity

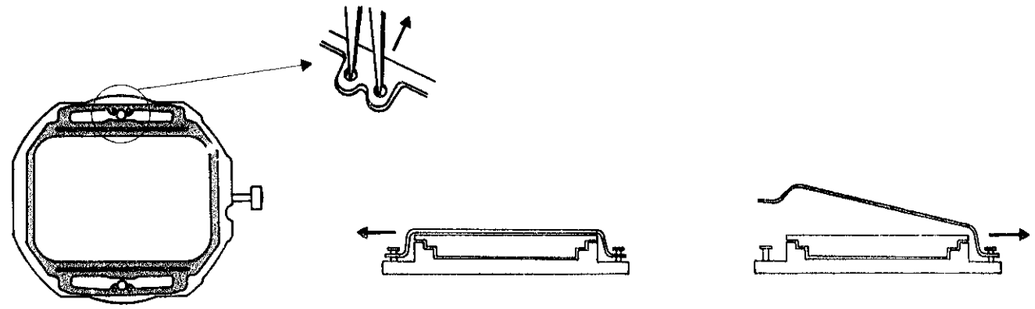
1. Liquid crystal panel side



Remarks for disassembling and reassembling

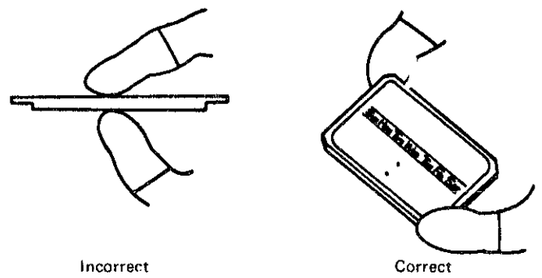
② Spring for liquid crystal panel

Insert the tips of the tweezers into the two holes of the spring for liquid crystal panel and pry it up in the arrow-marked direction for disassembling.



③ Liquid crystal panel

Use fingercots to disassemble and reassemble the liquid crystal panel. Be careful not to touch the surface of the liquid crystal panel with your fingertips.



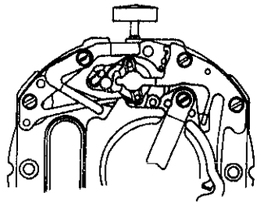
④ Reflecting mirror

Check to see if there are any scratches, contamination, lint or dust on the surface.

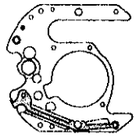
⑤ Connector

Although two connectors are used, there is no difference between the two. The black portions are conductive. Check to see if there are any scratches or contamination.

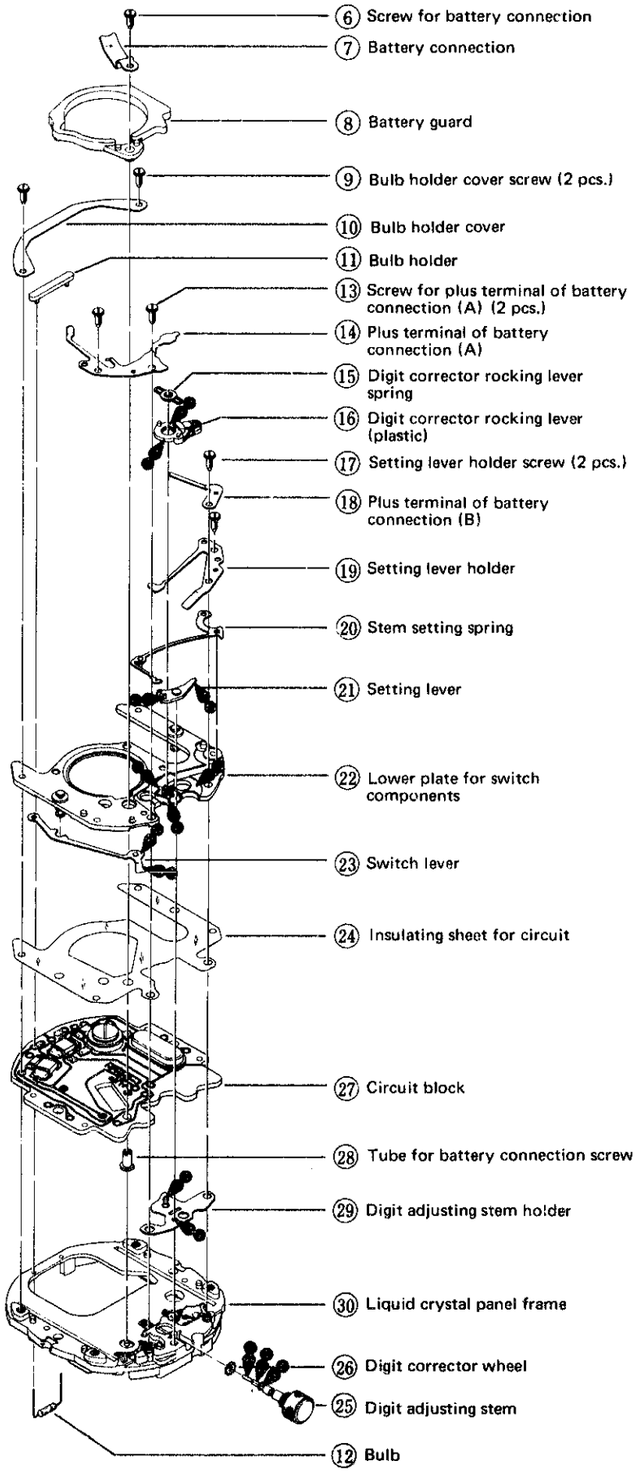
2. Switch mechanism side



Structural drawing of switch mechanism



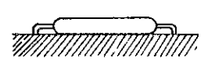
Lower plate for switch components and switch lever



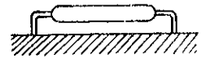
Remarks for disassembling and reassembling

⑫ Bulb

When replacing the bulb, disassemble the bulb holder.
The bulb can be replaced even if the switch mechanism is not disassembled. Be sure that the bulb is fixed in position without leaving any space between the bulb and the liquid crystal panel frame. And be careful not to touch the lead wires of the bulb to any other circuit patterns.



Correct



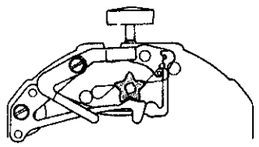
Incorrect

Correct

Incorrect

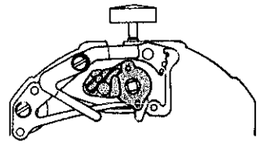
⑯ Digit corrector rocking lever

1) Lubricate the switch cam



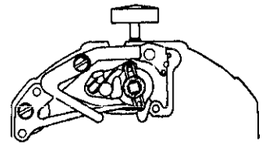
Lubricate more than two teeth of the switch cam. The teeth should be lubricated on the side portion of the teeth near the tip.

2) Set the digit corrector rocking lever



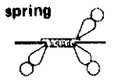
Insert the switch pin of digit corrector rocking lever into the hole of lower plate for switch components.

3) Set the digit corrector rocking lever spring

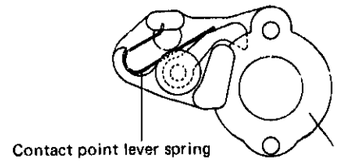


Place the digit corrector rocking lever spring on the digit corrector rocking lever and while slightly pushing the lever, with fingertips turn the crown. Then the digit corrector rocking lever spring will be set in the correct position.

Side section of digit corrector rocking lever spring

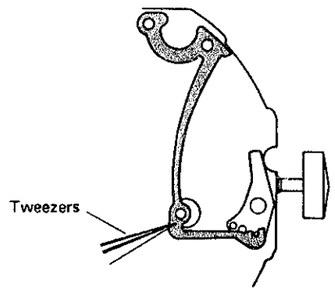


The contact point lever spring is incorporated into the digit corrector rocking lever.
Do not disassemble the contact point lever spring except in case of replacement.
When reassembling the contact point lever spring, place it as shown in the illustration.



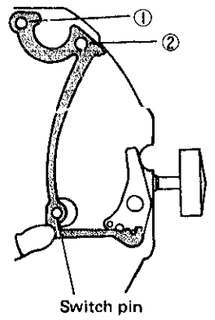
⑳ Stem setting spring

How to reassemble



Pry up with tweezers for disassembling

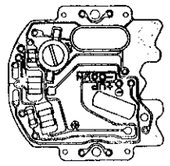
How to disassemble



Set the switch pin of the stem setting spring on the lower plate for switch components. While holding the switch pin with a finger, set the two portions ① and ② on the two pins.
After setting the setting lever holder, engage the tip of the stem setting spring to the pin of the setting lever.

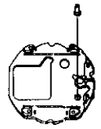
㉗ Circuit block

Circuit block has a number of patterns. When disassembling and reassembling, be sure to pick up the circuit block with tweezers or finger tips with fingercots by the portion marked with mesh.



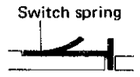
㉘ Tube for battery connection screw

Be sure to set the tube for battery connection screw in the liquid crystal panel guard.



㉚ Liquid crystal panel frame

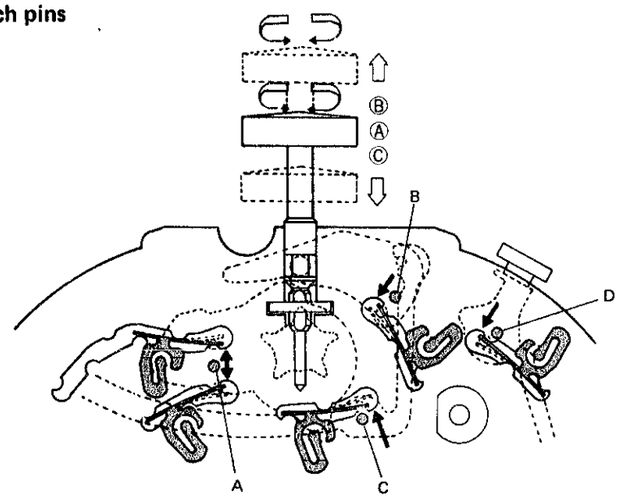
Do not take out the switch springs (5 pcs.) except in case of replacement. If the switch springs are taken out, set them in the same positions and directions as shown in the illustration.



Seen from the side

Seen from the top

3. Relation between the switch springs and the switch pins



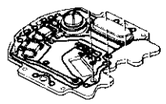
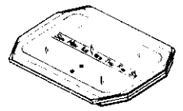
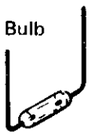
1) Changeover from date display to second display and vice versa
   . . . Turn the crown in the normal position → Digit corrector rocking lever (Switch pin A) touches the switch spring.

2) Adjustment of display
   - Pull out the crown → Setting lever (switch pin B) touches the switch spring → Digits are ready to be adjusted
   - Turn the crown in the first click → Digits corrector rocking lever (switch pin A) touches the switch spring—
     → Selection of the digits adjusted by turning the crown clockwise.
     → Adjustment of the digits by turning the crown counterclockwise.

3) Activating the light
   . . . Push the crown → Stem setting spring (Switch pin C) touches the switch spring.

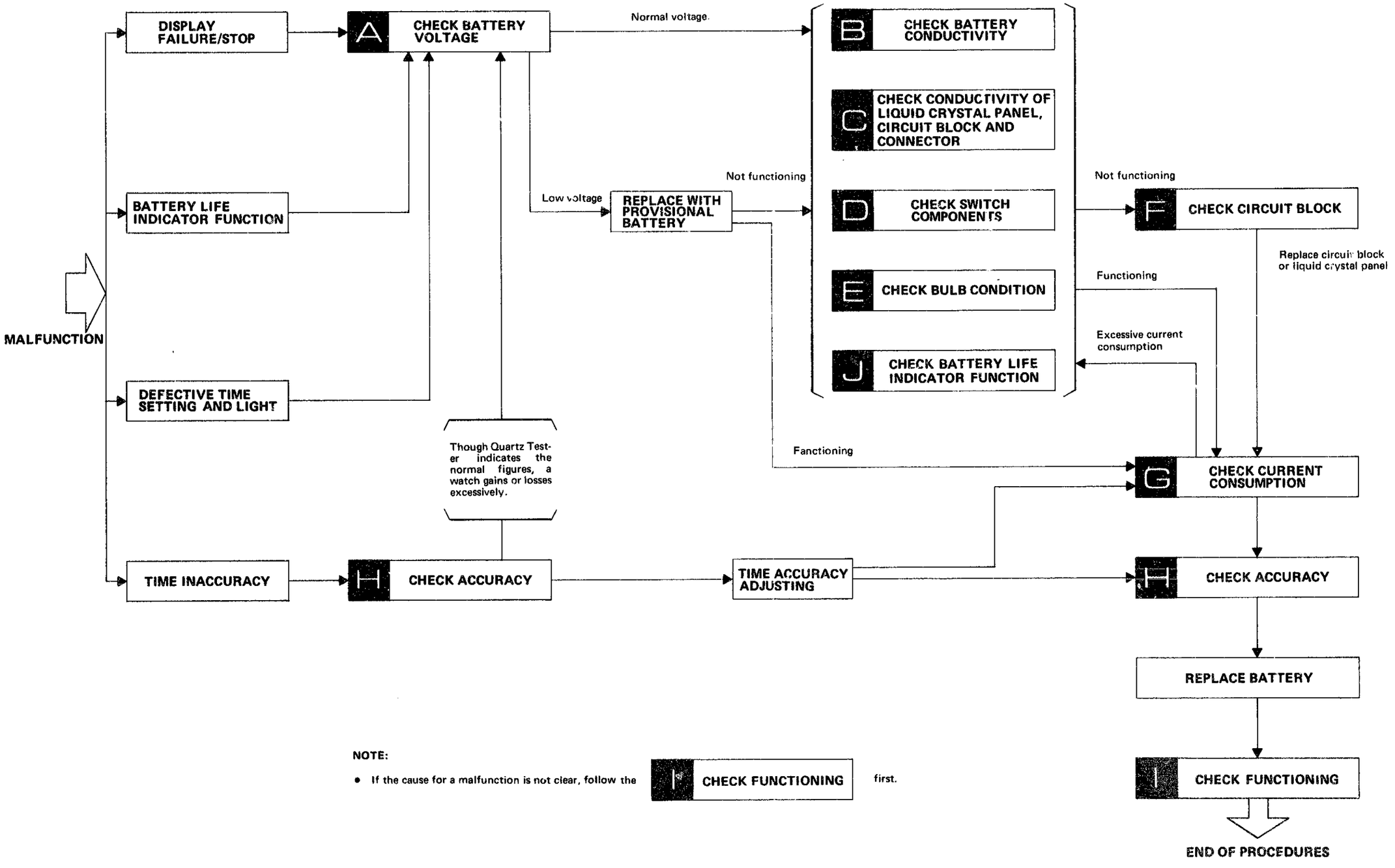
4) Changeover of display
   . . . Push the side button → Switch lever (Switch pin D) touches the switch spring.

4. Cleaning

Name of parts	Cleaning	Drying	Solution	Remarks
Circuit block  Liquid crystal panel  Reflecting mirror  Filter  Bulb 	DO NOT CLEAN			• Clean the conductive portion only with a cloth moistened with benzine. Dry in COOL air. • Wipe dust and lint off with a soft, dry brush.
Connector 	Rinse or scrub with a soft brush	Cool air	Alcohol	• Clean the connected portion of the connector to the liquid crystal panel and the circuit block.
Plastic parts	Rinse or scrub with a soft brush	Cool air	Benzine, alcohol	
Other parts	Clean with cleaner, rinse or scrub with a soft brush	Hot or cool air	Benzine, trichloro-ethylene or alcohol	

V. CHECKING AND ADJUSTMENT

1. Guide table for checking and adjustment

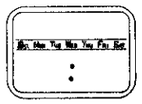


NOTE:

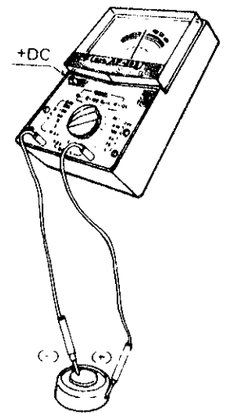
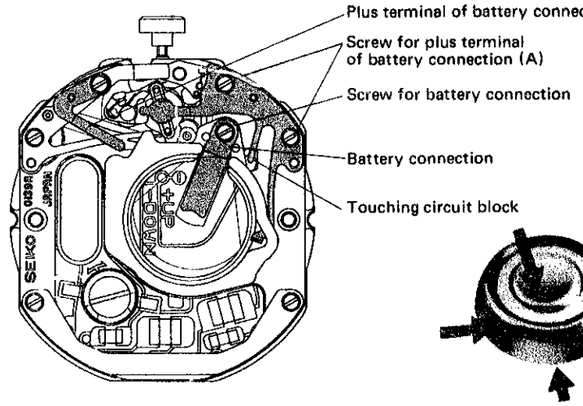
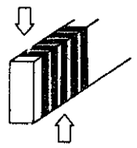
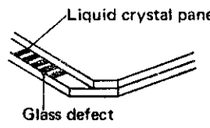
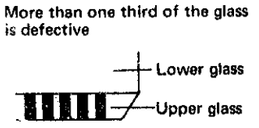
- If the cause for a malfunction is not clear, follow the I CHECK FUNCTIONING first.

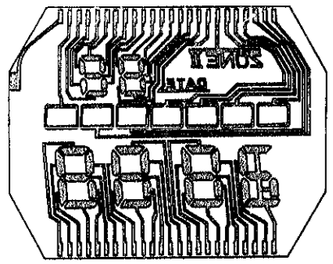
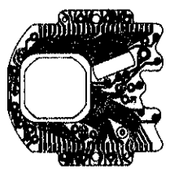
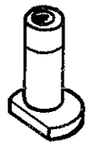
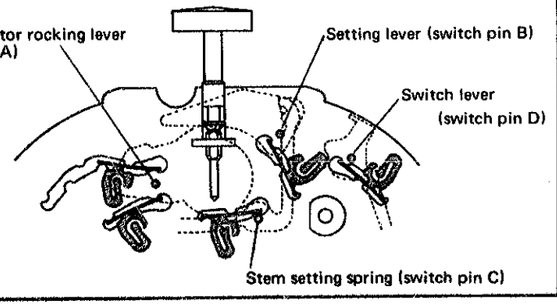
2. Malfunction and checking points

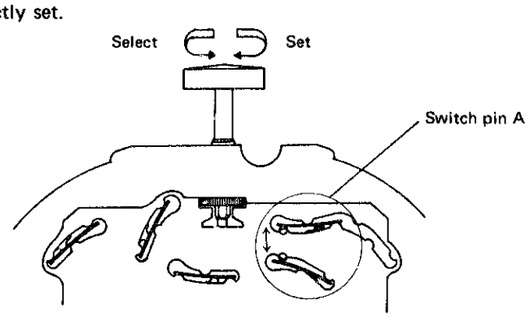
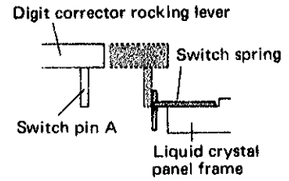
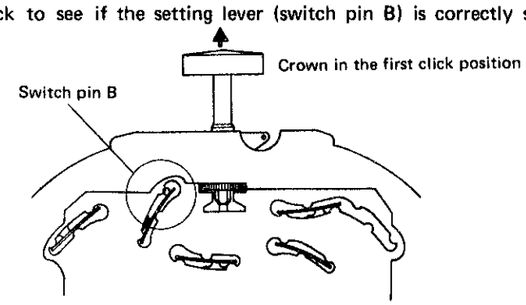
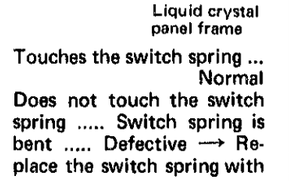
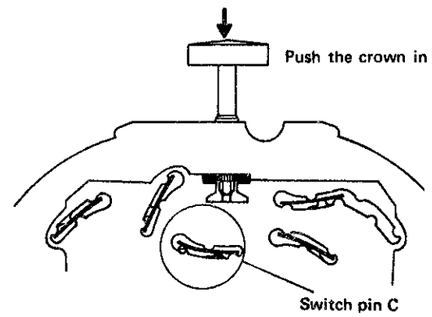
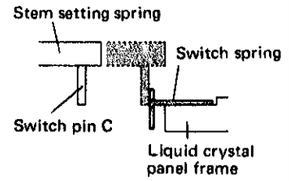
- Check in numerical order
- Refer to "Procedures for checking and adjustment" on page 17.

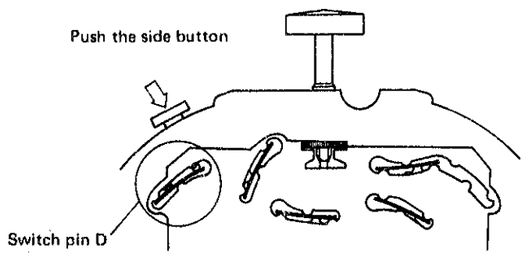
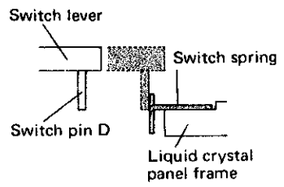
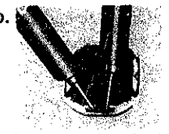
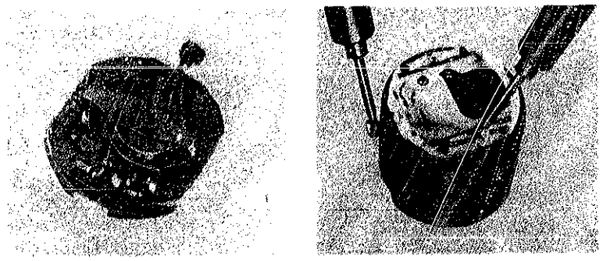
	FAULTY SYMPTOMS	CHECKING PORTIONS								
		A	B	C			D	E	F	J
		Battery	Battery conductivity	Liquid crystal panel	Circuit block	Connector	Setting mechanism	Bulb	Circuit block	Battery life indicator function
DISPLAY FAILURE	Stop (Though the digits are displayed, digits figures do not change.)	①	②		④		③			
	No digital display, dim display or extremely poor response. 	①	②	④	⑤	⑥	③		⑦	
	Some segments of the digital figures are not lighted or dim. 			②	③	①				
	All segments are displayed or the segment which should be on and off are reversed as shown in the illustration. 			②	③	①				
	Some portions of the liquid crystal panel will make black dots or iridescent circles. 			①						
TIME INACCURACY	Gain or loss tested by the Quartz Tester.	①	②							
	Though Quartz Tester indicates the normal figures, a watch gains or loses when it is worn on the wrist.	①	②		③					
DEFECTIVE TIME SETTING OR LIGHT	Light is not lit or light is lit but dims soon.	①					③	②		
	Digits adjusting is impossible or the digital display is extinguished while digits adjusting is being made.				②				①	
	All digits displayed are flashing.	①								②

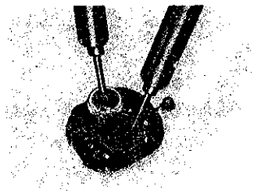
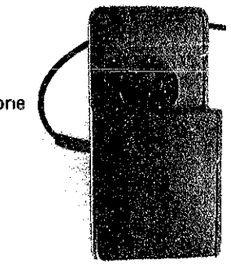
3. Procedures for checking and adjustment

	Procedure	Result
A CHECK BATTERY VOLTAGE	Use the following procedures to check battery voltage. **(1) Set up the volt-ohm-meter** Range to be used: DC 3 V **(2) Measuring** • Probe Red (+) . . . . Battery surface (+) • Probe Black (–) . . . Battery surface (–) 	More than 1.5 V ..... Normal Less than 1.5 V ... Defective → Replace battery
B CHECK BATTERY CONDUCTIVITY	(1) Check for any contamination on the battery, battery connection and plus terminal of battery connection, (A), (B). (2) Make sure that the screw for battery connection and the screw for plus terminal of battery connection (A) are tightened firmly. 	Uncontaminated .... Normal Contaminated ..... Defective → Wipe off any foreign matter. No loosened screws . Normal Loosened screws ... Defective → Retighten screw.
C CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR	(1) Check for stain, crack and tiny break in the connector.  • Check carefully the connecting portions of the liquid crystal panel and the circuit block. (2) Check the liquid crystal panel electrode (connecting portion of the connector) for any foreign matter and glass defect.   Replace liquid crystal panel	No foreign matter ... Normal Contaminated ..... Defective → Wipe off with a cloth moistend with alcohol. Crack or tiny break . . . . Defective → Replace the connector with new one. Uncontaminated .... Normal Contaminated ..... Defective → Wipe off with a cloth moistend with alcohol. Glass defects ..... Defective → Replace liquid crystal panel with a new one.

	Procedure	Result
C CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR	(3) If segments are dead (Some segments are partially dimmed), check liquid crystal panel. **1. Set up the volt-ohm-meter** • In case AF 105 volt-ohm-meter is used. Range to be used: OHMS R × 1 • In case other volt-ohm-meter is used. Range to be used: R × 1 If no display appears when the above range "R × 1" is used, change the range to other ones such as "R × 10K" 2. Check for any dead segments on the liquid crystal panel and if any, remove the liquid crystal panel from the movement and turn the panel upside down. 3. Apply red and black probes of the volt-ohm-meter to the common electrode of the liquid crystal panel and the electrode of defective segments. (Either red or black probe can be applied to both electrodes.) Common electrode  Check the position of the common electrode as shown in the illustration. Note: The panel pattern might be seen if the pattern is looked through askance.	Lights up ..... Normal Does not light up .. Defective → Replace liquid crystal panel.
	(4) Check for any contamination on the circuit block electrode and the tube for battery connection screw.   Function of the tube for battery connection screw. To flow electric current from the battery (–) to the circuit (+).	Uncontaminated ..... Normal Contaminated ..... Defective →Wipe off with a cloth moistend with alcohol.
D CHECK SWITCH COMPONENTS	(1) Check for any contamination and defects on the switch spring (5 pcs.) and switch pins A, B, C and D. 	Uncontaminated an no defects ..... Normal Contaminated ..... Defective →Wipe off carefully. Defects ..... Defective →Replace the defective parts (with switch pin) or switch spring.

	Procedure	Result
D CHECK SWITCH COMPONENTS	(2) In case changeover from date display to second display or vice versa is impossible. Check to see if the digit corrector rocking lever (switch pin A) is correctly set.  If the crown is turned clockwise and counterclockwise in the normal position or in the first click position, the switch cam turns clockwise and counterclockwise and the digit corrector rocking lever (switch pin A) touches the switch spring, which if the crown is in the normal position, makes it possible for the date and second display to be changed from one to the other and which if the crown is pulled out to the first click, enables the display to be adjusted.	 Touches the switch spring ... Normal Does not touch the switch spring ..... Switch spring is bent ..... Defective → Replace the switch spring with a new one. Switch pin A is bent ..... Defective → Replace the digit corrector rocking lever with new one.
	(3) In case adjustment of display is impossible Check to see if the setting lever (switch pin B) is correctly set.  Switch pin B touches the switch spring, which makes it possible for the display to be adjusted.	 Touches the switch spring ... Normal Does not touch the switch spring ..... Switch spring is bent ..... Defective → Replace the switch spring with a new one. The switch pin B is bent ..... Defective → Replace the setting lever with a new one.
	(4) In case the bulb does not light up Check to see if the stem setting spring (switch pin C) is correctly set. 	 Touches the switch spring ... Normal Does not touch the switch spring → The switch spring is bent ..... Defective → Replace the switch spring with a new one. The switch pin C is bent ..... Defective → Replace the stem setting spring with a new one.

	Procedure	Result
D CHECK SWITCH COMPONENTS	(5) In case changeover from the Basic Display to the Zone II Display or vice versa is impossible. Check to see if the switch lever (switch pin D) is correctly set.  The switch lever (Switch pin D) touches the switch spring and changeover from Basic Display (12-hour indicator) to Zone II Display (24-hour indication) and vice versa become possible.	 Touches the switch spring ... Normal Does not touch the switch spring ⟶ The switch spring is bent ..... Defective ⟶ Replace the switch spring with a new one. The switch pin D is bent ..... Defective ⟶ Replace the switch lever with a new one.
E CHECK BULB CONDITION	Check to see if there is a broken filament in the bulb. **1. Set up the volt-ohm-meter** Range to be used: OHMS R × 1 **2. Checking** Apply the probes (Either red or black probe will do) to the two terminals of the bulb.  Remove the bulb holder and the bulb holder cover.	Light is lit ..... Normal Light is not lit ..... Defective → Replace the bulb with a new one.
F CHECK CIRCUIT BLOCK	Check to see if an electric signal flows normally from the circuit block to the liquid crystal panel. **1.** According the disassembling procedures, remove the spring for liquid crystal panel, filter and liquid crystal panel. **2.** Put the battery into the movement and secure it with the battery holding spring. **3. Set up the Volt-ohm-meter** Range to be used: DC3V **4. Measuring** • Probe Red (+) .... Crown or digit adjusting stem • Probe Black (–) ... Black portion of connector  **NOTE:** Touch the connector lightly with the probes.	0.8 V ~ 1.4 V ..... Normal Out of the above range ..... Defective ⟶ Replace the circuit block with a new one. (The above voltage figures are obtained only if AF-105 type Volt-ohm-meter shown on the Technical Guide or a type of Volt-ohm-meter with higher internal resistance is used.)

	Procedure	Result
G CHECK CURRENT CONSUMPTION	Check to see if the current consumption is normal **1. Set up the Volt-ohm-meter** Range to be used: DC 0.03 mA **2. Measuring** Probe Red (+) ..... Battery connection Probe Black (–) ..... Battery surface (–)  Place the battery on the metal housing of the crystal oscillator with its minus surface turned up.	Less than 4.2 μA ⟶ Normal More than 4.2 μA ⟶ Difective → Proceed to B C D F
H CHECK ACCURACY	Check gain and loss of time. • **Set up the Quartz Tester** Use the electric-field detection microphone for the liquid crystal watch. 	
TIME ACCURACY ADJUSTING	Time accuracy is adjusted by turning the trimmer condenser. The watch will gain or lose according to the direction in which the trimmer condenser is turned. Adjustment should therefore be made after ascertaining with the Quartz Tester whether the watch tends to gain or lose. • Note for handling the trimmer condenser Avoid excessive depressing and turning of the trimmer condenser.	

I CHECK FUNCTIONING

Check to see if each time setting function works correctly using the crown operation.

Note:

Incomplete digital figures may show on the display panel after battery replacement. However, this is not a malfunction. Should this occur, pull out the crown to the first click and push it back to normal position.
Now, the electronic circuit is in a reset condition.
Pull out the crown again and adjust the time in accordance with the time signal.

1. First check

Turn the crown clockwise and counterclockwise in the normal position and check to see if the date display is changed to the second display and vice versa.

2. Second check

Push the side button in to check if the display changes from the Basic Display to the Zone II Display and vice versa.

3. Third check

Pull out the crown to the first click and turn clockwise and counterclockwise to see if selection and setting of the date, the day of the week, the hour and the minute can be made correctly. Next, change the mode and check in the same way. Make sure that there is no dead segment.

4. Fourth check

Pull out the crown to the first click and push it back to see if the second display is reset to "00" (When the seconds count any numbers from "00" to "29", the seconds are reset to "00" automatically. When, however, the seconds count any numbers from "30" to "59", one minute is added and the seconds immediately return to "00".)

5. Fifth check

Depress the crown at the normal position and make sure that the light is lit.

J CHECK BATTERY LIFE INDICATOR FUNCTION

Procedure	Result
1. First check	
(1) Set up the Micro Test. Voltage to be used: 1.1 V	
(2) Touch the watch slightly with the probe and clip. Clip Red (+) . . . . . Crown or stem Probe Black (–) . . . Battery connection	
(3) Set the time at 11:59 A.M. of the Basic Display (12-hour) Indication).	Flashing ..... Normal
(4) Check to see if the battery life indicator functions correctly (all digital display start flashing) when the display indicates 12:00.	No flashing ..... Replace the circuit block with a new one.
2. Second check	
(1) Set up the Micro Test. Voltage to be used: 1.5 V	No flashing ..... Normal Flashing ..... Replace the circuit block with a new one.
(2) Follow the same procedures as in (2) ~ (4) of the First check.	

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