

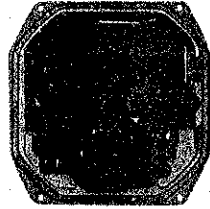
**SEIKO**

**DIGITAL QUARTZ**

**Cal. F421A**

**PARTS LIST**

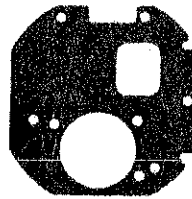
# Cal. F421A



4001 129



4216 049



4216 056



4245 024



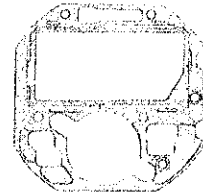
4270 029



4313 027



4398 162



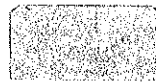
4398 163



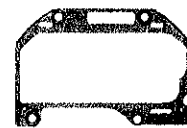
4398 164



4510 282



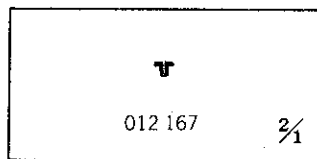
4521 022



4540 009



☆ SEIKO TR912SW



012 167

$\frac{2}{1}$

# Cal. F421A

## Characteristics

Casing diameter :  $\phi$  27.0 mm  
 Maximum height : 1.2 mm without battery  
 Frequency of quartz crystal oscillator : 32,768 Hz (Hz = Hertz . . . . Cycles per second)  
 Time display : 12-hour Digital Display System showing hour, minute, second and "A"(AM)/"P"(PM).  
 Calendar display : Digital Display System showing date and day of the week. (The month is displayed only when the time and calendar settings are being adjusted.)  
 Display medium : Nematic Liquid Crystal, FE-Mode  
 Regulation system : Chip condenser  
 Battery life indicator : All the digits in the display begin flashing.

PART NO.	PART NAME	PART NO.	PART NAME
4001 129	Circuit block		
4216 049	Battery connection insulator		
4216 056	Insulator for circuit		
4245 024	Switch spring		
4270 029	Battery connection (-)		
4313 027	Connector		
4398 162	Battery guard		
4398 163	Liquid crystal panel frame		
4398 164	Switch spring ring		
4510 282	Liquid crystal panel		
4521 022	Reflecting mirror		
4540 009	Liquid crystal panel holder		
012 167	Module fixing screw		
☆SEIKO TR912SW	Silver peroxide battery		

### Remarks :

#### Battery

☆ SEIKO TR912SW . . . . . 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".

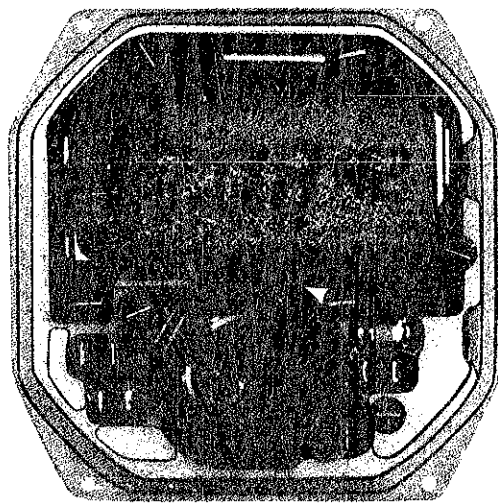
☆ ⇨ Please see remarks.

# TECHNICAL GUIDE

SEIKO

DIGITAL QUARTZ

CAL. F421 A



---

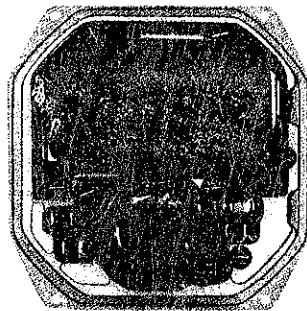
## CONTENTS

---

<b>I. SPECIFICATIONS</b> .....	1
<b>II. DISASSEMBLING, REASSEMBLING AND LUBRICATING</b> .....	2
1. Disassembling and reassembling of the case .....	2
2. Disassembling and réassembling of the module .....	3
<b>III. CHECKING AND ADJUSTMENT</b> .....	6
Check battery voltage .....	6
Check pattern segment checking system .....	6
Check conductivity of liquid crystal panel, circuit block and connector .....	6
Check circuit block and liquid crystal panel .....	7
Check current consumption .....	8
Check accuracy .....	8
Check conductivity of switch components .....	8

## I. SPECIFICATIONS

Item	Cal. No.	F421A
Display medium		Nematic Liquid Crystal, FEM (Field Effect Mode)
Display system		<p>Three-function changeover system with time, calendar and time/calendar setting functions.</p> <ul style="list-style-type: none"> <li>• Time display: 12-hour digital display system showing hour, minute and second.</li> <li>• Calendar display: Day and date are displayed for 2 seconds only while a button is depressed. Automatic calendar system (Automatically adjusts for even and odd months except February of leap years). Month is displayed only when the calendar digit is adjusted.</li> <li>• Time/calendar setting function: Setting of the second, minute, hour ("A" (for AM)/"P" (for PM)), date, month and day of the week.</li> </ul>
Additional mechanism		Battery life indicator (All the digits in the display starts flashing when the battery life nears its end.)
Crystal oscillator		32,768 Hz (Hz = Hertz . . . . . Cycles per second)
Loss/gain		<p>Loss/gain at normal temperature range  Mean monthly rate: less than 15 seconds  Annual rate: less than 3 minutes</p>
Casing diameter		$\phi$ 27.0 mm (24.0 mm between 6 o'clock and 12 o'clock sides; 24.0 mm between 3 o'clock and 9 o'clock sides)
Height		1.2 mm without battery
Operational temperature range		-10°C ~ +60°C (14°F ~ 140°F)
Regulation system		Chip condenser
Measuring gate by Quartz Tester		Any gate is available.
Battery power		<p>Silver peroxide battery SEIKO TR912SW  Battery life is approximately 1 year.  Voltage: 1.55V</p>
IC (Integrated Circuit)		C-MOS-IC . . . . . 1 piece




## II. DISASSEMBLING, REASSEMBLING AND LUBRICATING

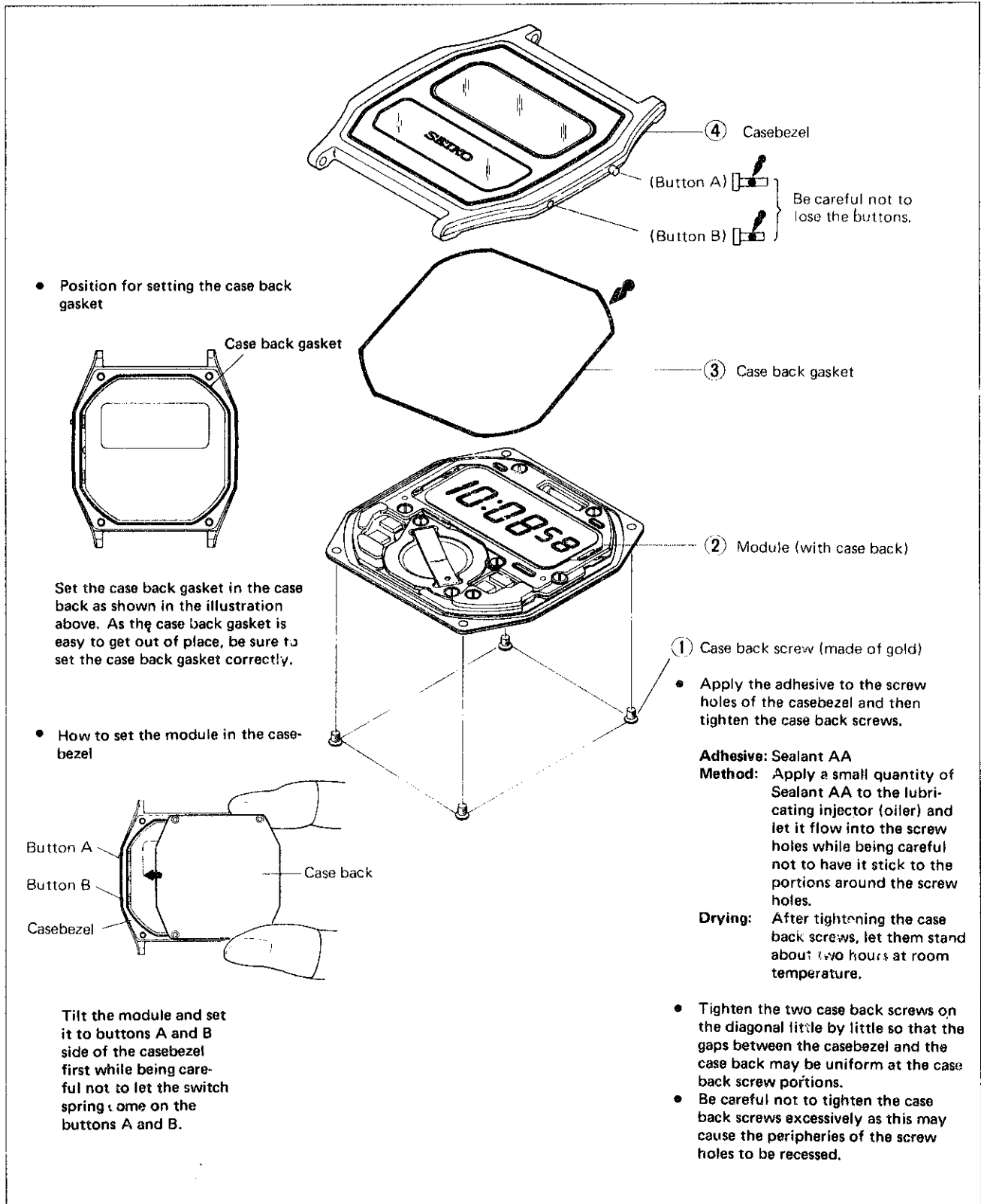
### 1. Disassembling, reassembling and lubricating of the case

Disassembling procedures Figs.: ① - ④

Reassembling procedures Figs.: ④ - ①

Lubricating: Silicone grease (500,000 c.s.), normal quantity 

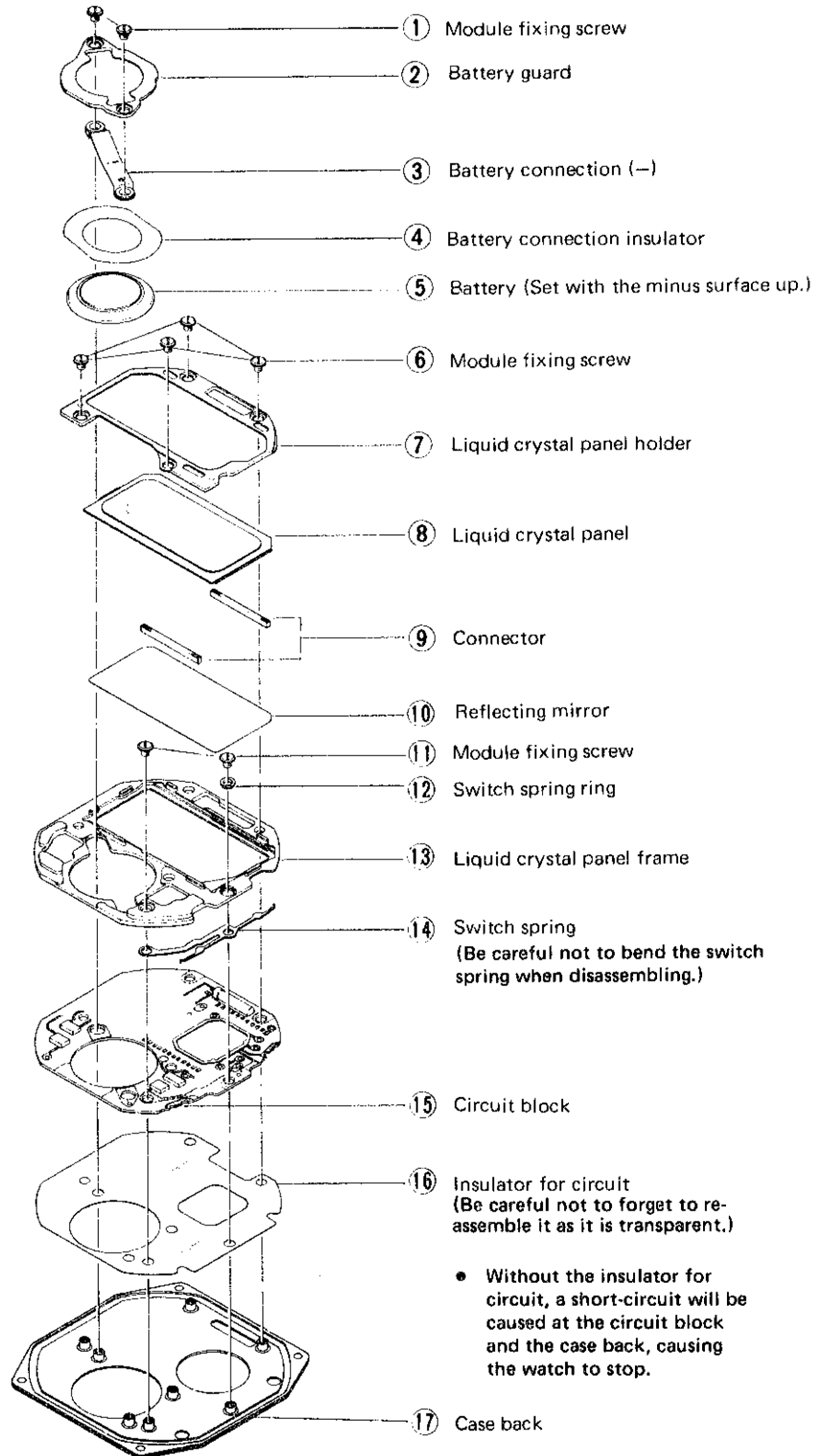
- Be careful in handling the case and module parts as the case is made of 18 carat gold and the module parts are extremely thin.



## 2. Disassembling and reassembling of the module

Disassembling procedures Figs.: ① - ⑰

Reassembling procedures Figs.: ⑰ - ①





*Remarks for disassembling and reassembling*

① ⑥ ⑪ **Module fixing screw**

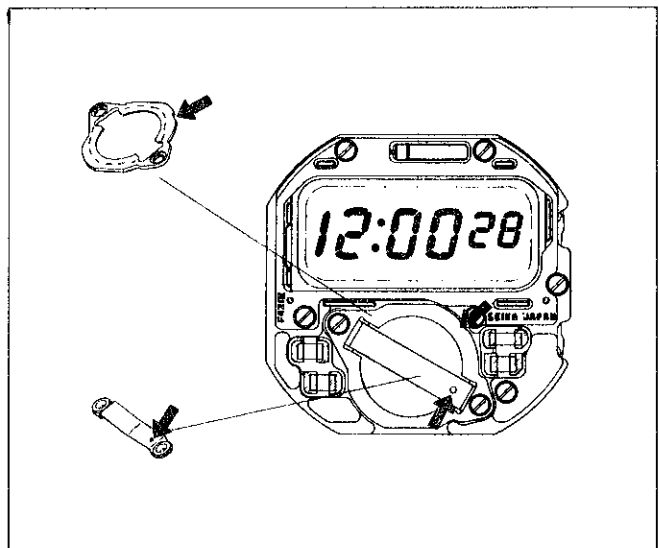
The module fixing screws are tightened after parts are set in the screw tube standing on the case back. Therefore, excessive tightening of the module fixing screws will cause the screw tube portion of the case back to be recessed. Be careful not to tighten the module fixing screws excessively.

- Tighten each module fixing screw little by little while being careful not to tighten one particular module fixing screw too much.
- When tightening the module fixing screws, make sure that the case back is not recessed.

② **Battery guard**

Set the battery guard while using the notch (arrow-marked) as a guide.

(The battery guard is made of aluminum and the area inside the dotted circle is so thin that it is easily bent. When tightening the screws, hold the periphery of the battery guard slightly with the fingers.)

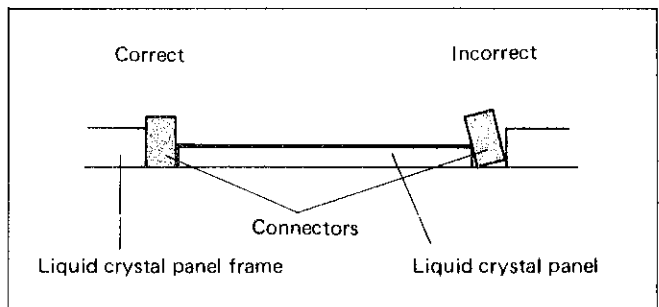


③ **Battery connection (-)**

Set the battery connection (-) while using the hole (arrow-marked) as a guide.

⑨ **Connector**

Before setting the liquid crystal panel, make sure that the connectors do not have a tilt.

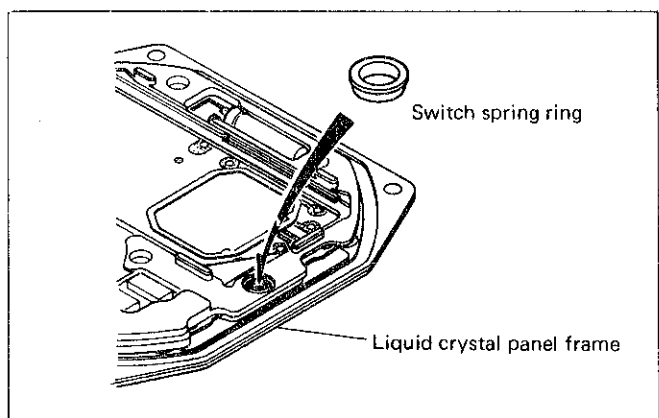


⑩ **Reflecting mirror**

Be careful not to mistake the upper side of the reflecting mirror for the lower side. Set the glistening surface to the lower side (liquid crystal panel frame side). Be careful in handling the reflecting mirror as it is thin.

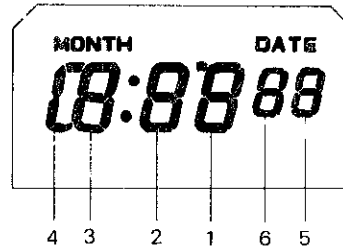
⑫ **Switch spring ring**

Set the switch spring ring in the liquid crystal panel frame as shown in the illustration on the right. Be careful not to lose it.



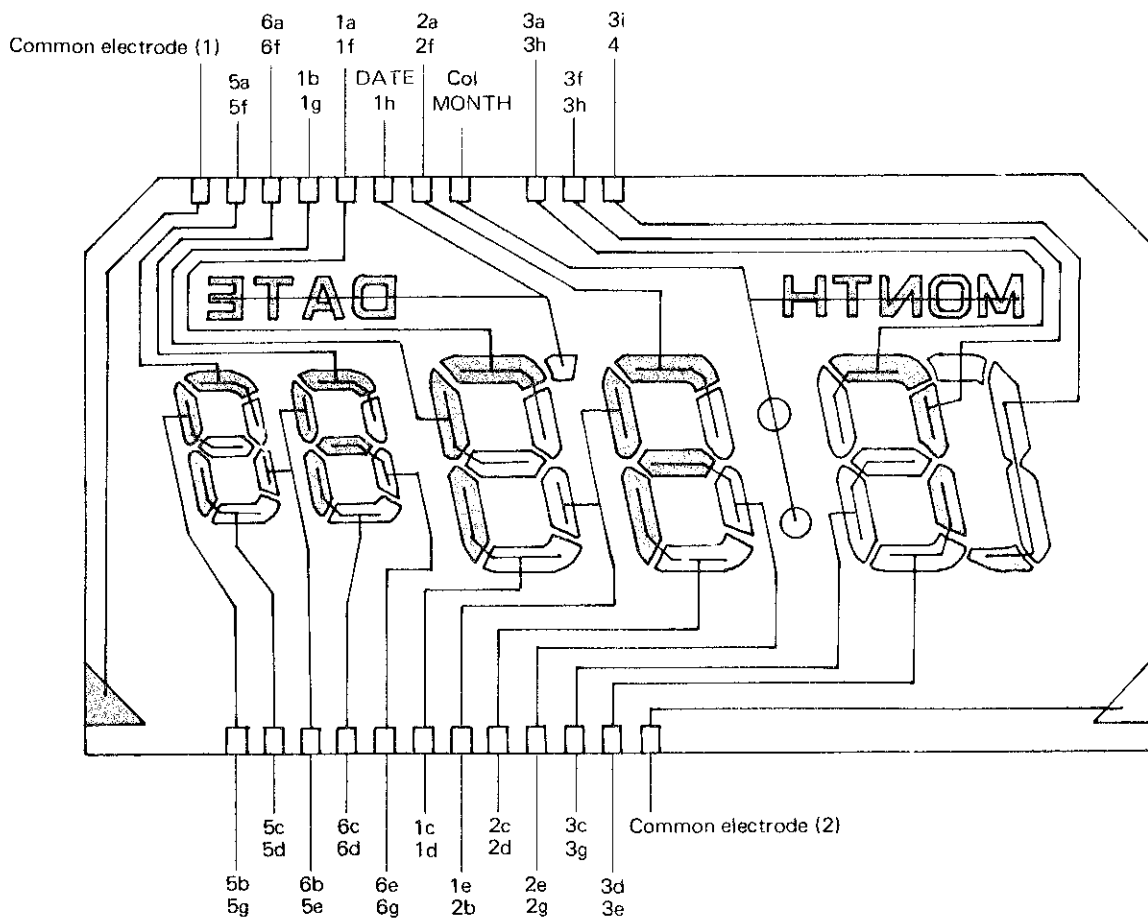
## Segment (Liquid Crystal Panel Electrode)

### • Designation of segment

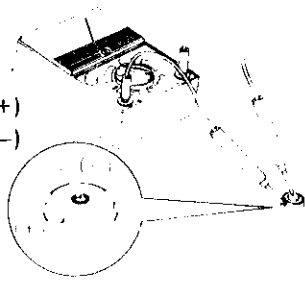
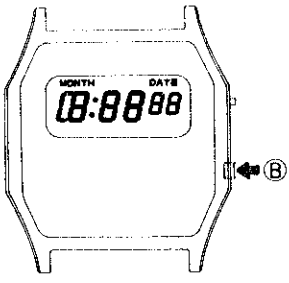
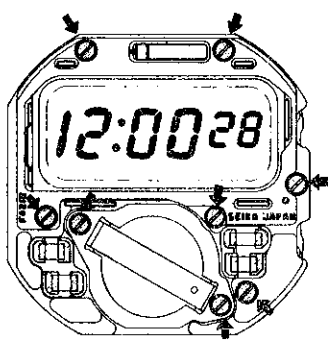
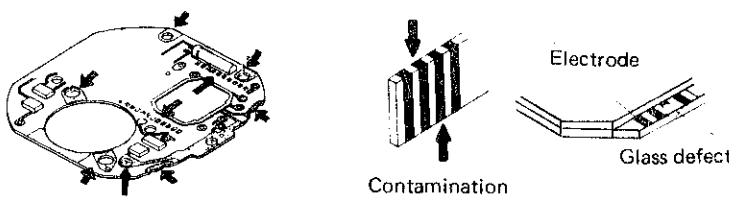


Common electrode (1) is connected electrically with segments 1 2 3 4.

Common electrode (2) is connected electrically with segments 5 6.



### III. CHECKING AND ADJUSTMENT

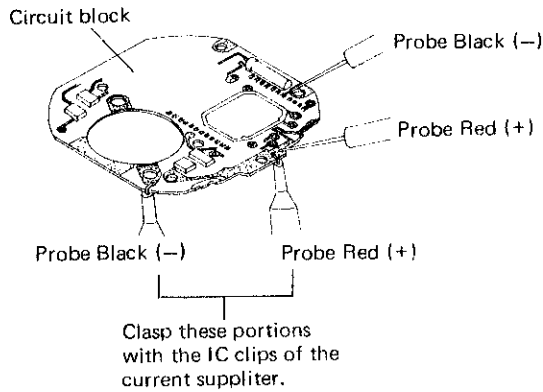
	Procedure	Result and Repair
CHECK BATTERY VOLTAGE	<p>Check battery voltage.</p> <ul style="list-style-type: none"> <li>• Set up the Volt-ohm-meter. Range to be used: DC 3V</li> <li>• Measuring Probe Red (+) . . . . . Battery surface (+) Probe Black (-) . . . . . Battery surface (-)</li> </ul> 	<p>More than 1.5V: Normal Less than 1.5V: Defective Replace the battery with a new one.</p>
CHECK PATTERN SEGMENT CHECKING SYSTEM	 <ul style="list-style-type: none"> <li>• When button (B) is depressed and held for 4 to 5 seconds, all the segments are displayed. Check to see which segment is defective.</li> <li>• Depress either button (A) or (B) to return to the normal display.</li> </ul>	<p>Only one segment does not light up: Proceed to <u>Replace the liquid crystal panel</u>.</p> <p>Two or more segments are not displayed: Proceed to <u>CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR</u>.</p>
CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR	<p>(1) Check to see if the screws are tightened firmly.</p>  <p>(2) Check for dust, lint, contamination, break, crack or scratch on the conductive portions shown in the illustration below.</p>  <p>Circuit block      Connector      Liquid crystal panel</p>	<p>No loosened screws: Normal Proceed to <u>CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR</u> (2).</p> <p>Loosened screws: Defective Retighten the screws.</p> <p>No dust, lint or contamination: Normal</p> <p>Dust, lint or contamination: Defective Wipe off any foreign matter.</p> <p>No break, crack or scratch: Normal</p> <p>Break, crack or scratch: Defective Replace with new ones.</p>

**Procedure**

**Result and Repair**

(1) Check to see if the electric signal flows from the circuit block correctly.

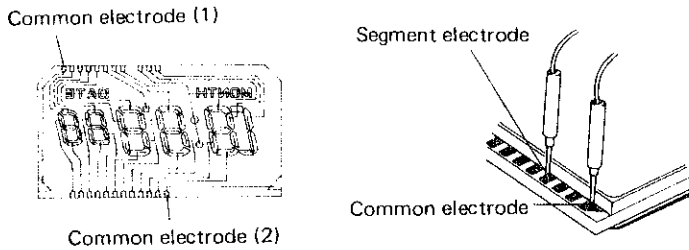
1. Supply the current to the circuit block by using the current supplier (S-833).  
 Clip (+) . . . . . Circuit block electrode (+)  
 Clip (-) . . . . . Circuit block electrode (-) } See illustration below.
2. Set up the Volt-ohm-meter.  
 Range to be used: DC3V  
 Probe Red (+) . . . . . Circuit block electrode (+)  
 Probe Black (-) . . . . . Circuit block segment electrode  
 (Apply to each portion.)



More than 0.8V: Normal  
 Less than 0.8V: Defective  
 Replace the circuit block with a new one.  
 (If some displays are defective, apply to the corresponding output terminals of the circuit block.)

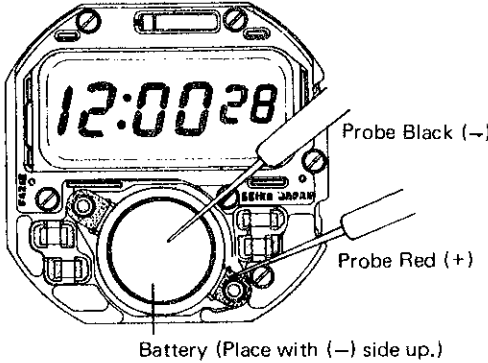
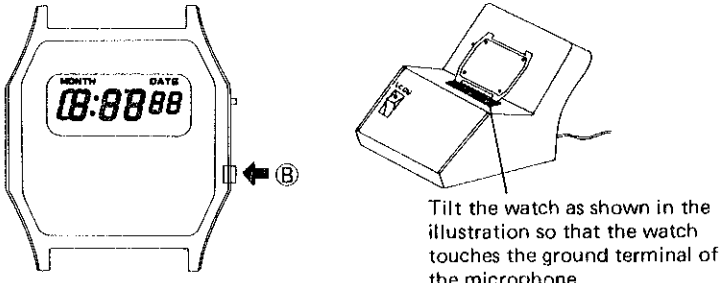
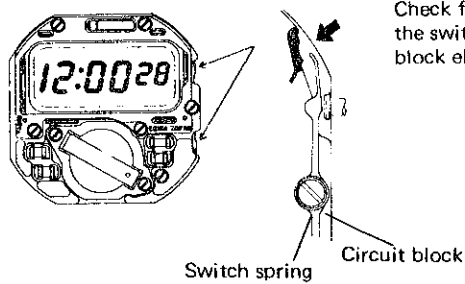
(2) Check for any broken panel pattern, short circuit, etc. of the liquid crystal panel.

1. Set up the Volt-ohm-meter.  
 Range to be used: OHMS x 1  
 (Any range will do if more than 3V is applied to the terminal of the Volt-ohm-meter.)
2. Apply the probes of the Volt-ohm-meter to the common electrode and the segment electrode of the liquid crystal panel.  
 (Either red or black probe will do.)



Lights up: Normal  
 Does not light up: Defective  
 Replace the liquid crystal panel.

- The two common electrodes are provided on the liquid crystal panel. Each segment shows up by the potential difference between each segment and one of the two common electrodes.
- See the illustration on page 5 for the combination of each segment and the common electrodes (1) and (2).

	Procedure	Result and Repair
CHECK CURRENT CONSUMPTION	<p>Check to see if the current consumption is normal.</p> <ol style="list-style-type: none"> <li>1. Set up the Volt-ohm-meter. Range to be used: DC 12<math>\mu</math>A</li> <li>2. Measuring Probe Red (+) . . . . . Circuit block electrode (-) Probe Black (-) . . . . . Battery surface (-)</li> </ol> 	<p>Less than 1.8<math>\mu</math>A: Normal Replace the battery with a new one.</p> <p>More than 1.8<math>\mu</math>A: Defective Proceed to <u>CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR.</u></p>
CHECK ACCURACY	<p>Depress button <math>\text{\textcircled{B}}</math> for 4 to 5 seconds and light up all the segments. Check loss and gain of time.</p> 	<p>Defective: Replace the circuit block with a new one. (The trimmer condenser is not installed.)</p>
CHECK CONDUCTIVITY OF SWITCH COMPONENTS	<p>Check to see if the switch components function correctly.</p>  <p>Check for the clearance between the switch spring and the circuit block electrode.</p> <p>Check for any dust, lint and other contamination on the conductive portions of the switch components.</p>	<p>Function correctly: Normal Do not function correctly: Defective Replace the switch spring or circuit block electrode with a new one if it is impossible to repair.</p>

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