

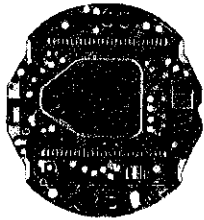
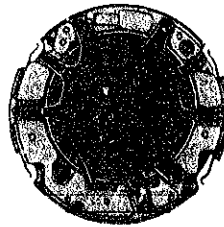
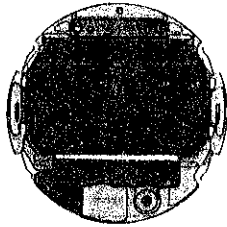
**SEIKO**

**DIGITAL QUARTZ**

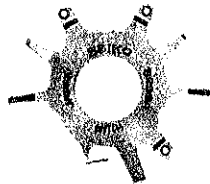
**Cal. S229A**

**PARTS  
CATALOGUE**

# Cal. S229A



4001 219



4225 202



4245 201



4245 202



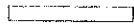
4246 202



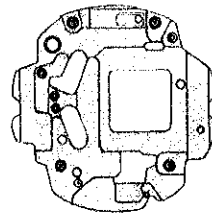
4246 203



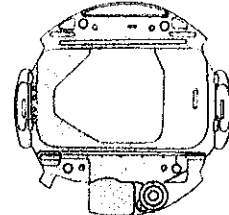
4270 201



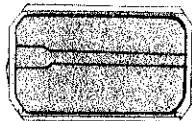
4313 037



4398 220



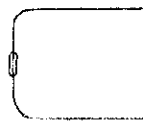
4398 221



4510 066



4521 066



4530 200



4540 012



4540 013



012 462



☆017 629



☆017 630

2/1



☆ Sanyo CR2016

# Cal. S229A

## Characteristics

Casing diameter :  $\phi$  29.0 mm  
 Maximum height : 6.0 mm without battery  
 Frequency of quartz crystal oscillator : 32,768 Hz (Hz=Hertz . . . . Cycles per second)  
 Time and calendar display : Hour (12-hour indication or 24-hour indication), minute, second, day, date, "A.M."/"P.M." (in the 12-hour indication), alarm mark, time signal mark, "TIME" mark in the middle. The month is displayed only when the calendar is adjusted.  
 Alarm display : Can be set to operate at any desired hour and minute every day.  
 Stopwatch display : Digital display system showing minute, second and 1/100 second up to 60 minutes. (When the measurement is over 60 minutes, hour, minute and second up to 24 hours.)  
 Lap time can be measured in the upper row. (Accumulated elapsed time measurement is displayed in the lower row.)  
 Pulse monitoring display : The pulse rate per minute can be displayed.  
 Time signal : Can be set to ring every hour on the hour.  
 Display medium : Nematic liquid crystal, FE-Mode.  
 Regulation system : Trimmer condenser.  
 Illuminating light : Illuminates all the digital displays in the dark by depressing the light button.

PART NO.	PART NAME	PART NO.	PART NAME
4001 219	Circuit block	☆ 017 629	Tube for liquid crystal panel holder screw (A)
4225 202	Battery clamp	☆ 017 630	Tube for liquid crystal panel holder screw (B)
4245 201	Switch spring (A)	☆ Sanyo CR2016 } ☆ Matsushita BR2016 } ☆ Maxell CR2016 }	Lithium battery
4245 202	Switch spring (B)		
4246 202	Speaker lead terminal		
4246 203	Sensor lead terminal		
4270 201	Battery connection (—)		
4313 037	Connector		
4398 220	Battery guard		
4398 221	Liquid crystal panel frame		
4510 066	Liquid crystal panel		
4521 066	Reflecting mirror		
4530 200	Bulb		
4540 012	Liquid crystal panel holder (A)		
4540 013	Liquid crystal panel holder (B)		
012 462	Liquid crystal panel holder screw		
012 462	Battery clamp screw		

## Remarks :

Tube for liquid crystal panel holder screw (A), (B).

☆017 629 } ..... Refer to the illustration below for the shape of Tube for liquid crystal panel holder screw (A), (B).  
 ☆017 630 }



☆017 629



☆017 630

## Battery

☆ Sanyo CR2016 }  
 ☆ Matsushita BR2016 } ..... The substitutive battery might be added to the applied battery in the future.  
 ☆ Maxell CR2016 } ..... In that case, please refer to separate "BATTERY LIST FOR SEIKO QUARTZ WATCHES".

☆ ⇨ Please see remarks.

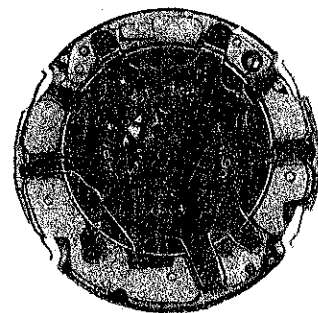
Part numbers in light letters are not shown in photos.

# TECHNICAL GUIDE

## SEIKO

## DIGITAL QUARTZ

CAL. S229A



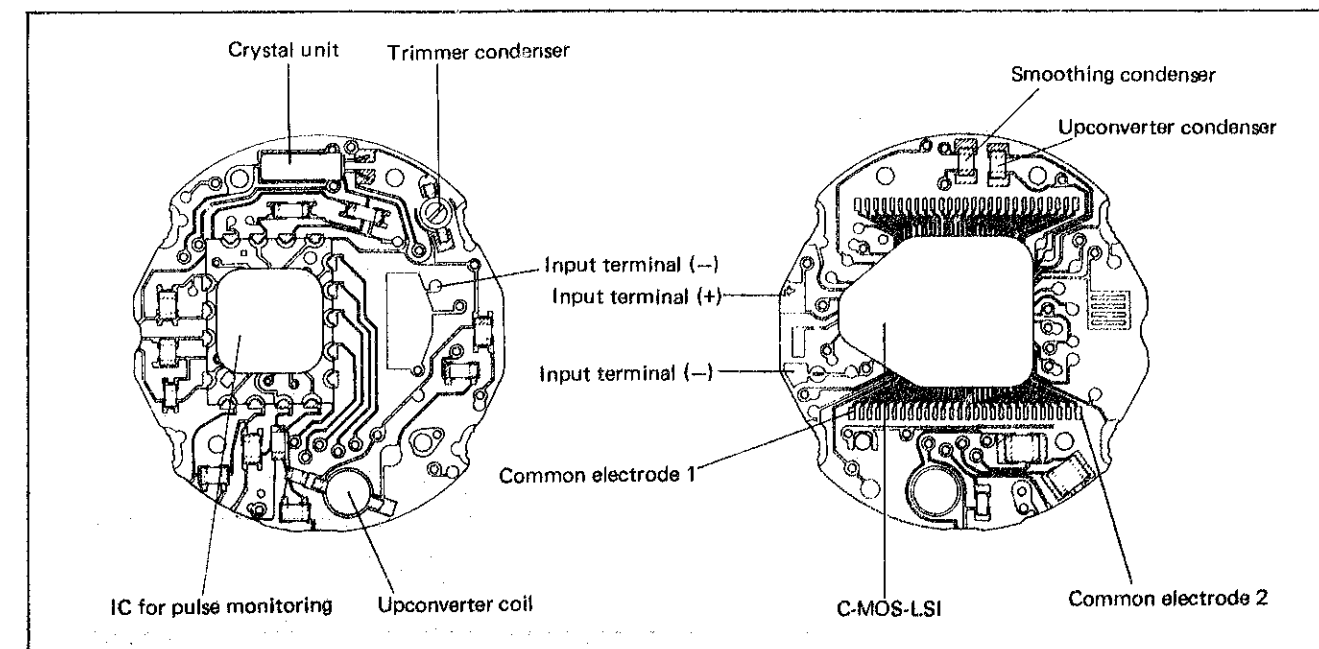
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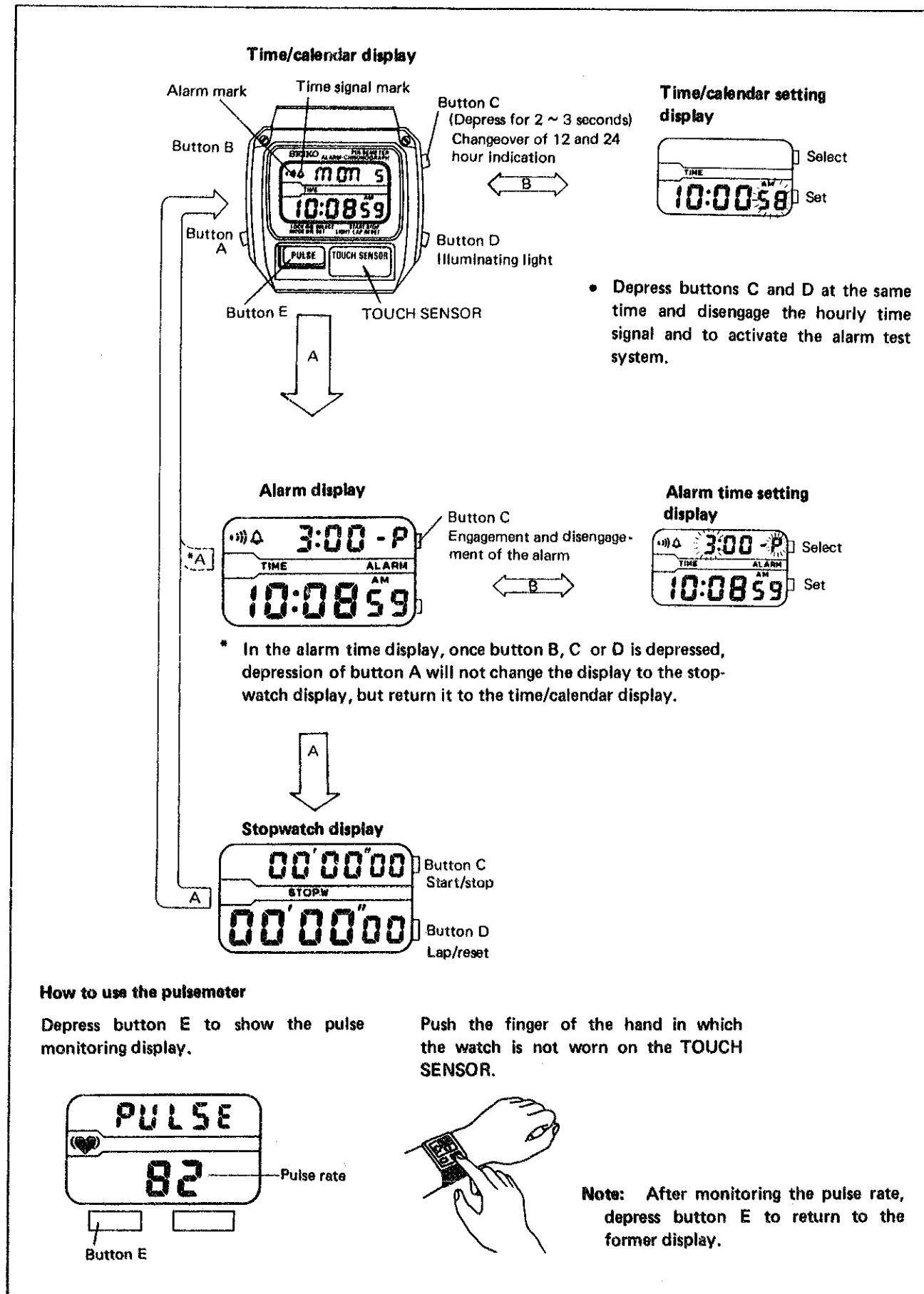
## I. SPECIFICATIONS

Cal. No.		S 229A
Item		
Display medium		Nematic liquid crystal, FEM (Field Effect Mode)
Liquid crystal driving system		Multiplex driving system
Display system		<ul style="list-style-type: none"> <li>• Time and calendar display (12-hour/24-hour indication)</li> <li>• Alarm display</li> <li>• Stopwatch display</li> <li>• Pulse monitoring display</li> </ul>
Additional mechanism		<ul style="list-style-type: none"> <li>• Hourly time signal</li> <li>• Alarm test system</li> <li>• Illuminating light</li> </ul>
Loss/gain		Loss/gain at normal temperature range Monthly rate: less than 15 seconds
Module size	Outside diameter	φ29.0 mm
	Height	6.0 mm without battery
Regulation system		Trimmer condenser
Measuring gate by Quartz Tester		Any gate is available.
Battery		Lithium battery: Sanyo CR2016, Maxell CR2016 or Matsushita BR2016. Battery life is approximately 3 years. Battery voltage: 3.0 V

## II. STRUCTURE OF CIRCUIT BLOCK

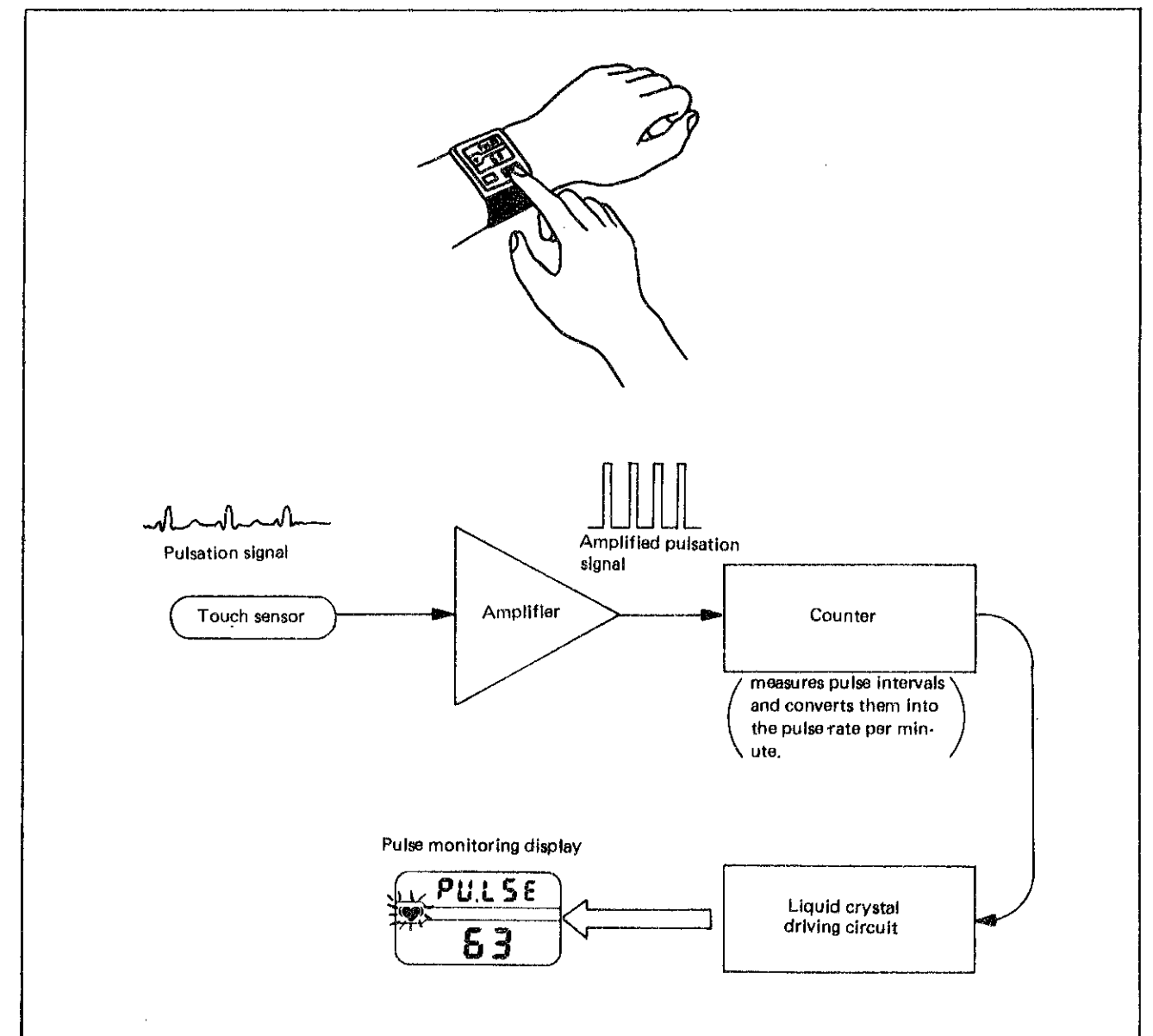


### III. DISPLAY FUNCTION



### IV. HOW TO MONITOR THE PULSE RATE

The human heart generates a weak current as it beats. This current can be picked up as electric signals when two electrodes are attached separately on the surface of the body. The electrocardiogram is a chart on which these electric signals are recorded. In the SEIKO Pulsemeter Digital Quartz, the case back functions as one electrode and the touch sensor acts as the other, enabling an easy monitoring of the pulse rate. When the watch is worn on one hand, and the touch sensor is depressed by a finger of the other hand, electric signals are conducted from the heart to the watch, in which they are converted into the pulse rate per minute for display. The illustration below shows a simple explanation of how to monitor the pulse rate.




## V. DISASSEMBLING, REASSEMBLING AND LUBRICATING OF THE CASE

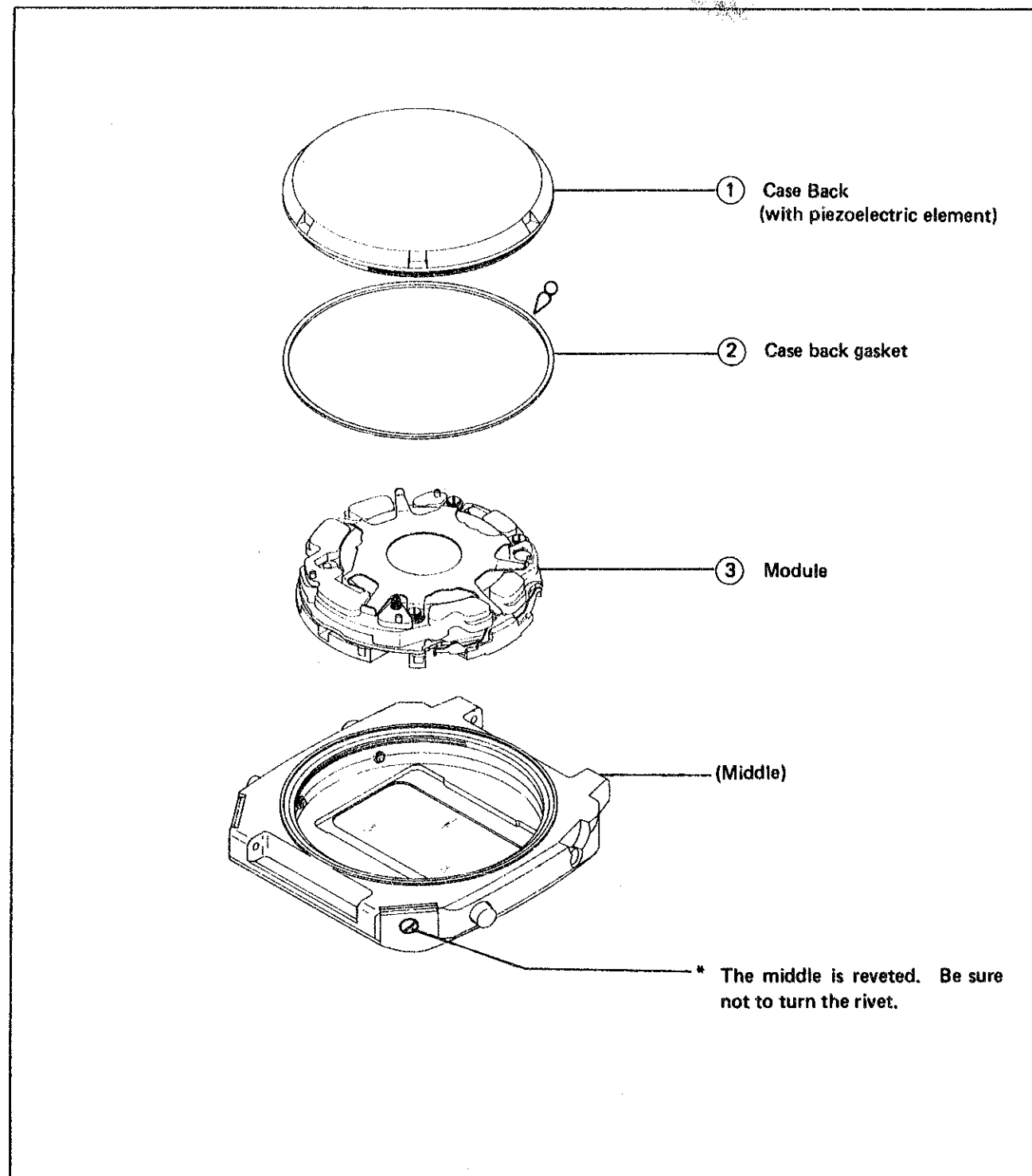
Disassembling procedures Figs. : ① → ⑫

Reassembling procedures Figs. : ⑫ → ①

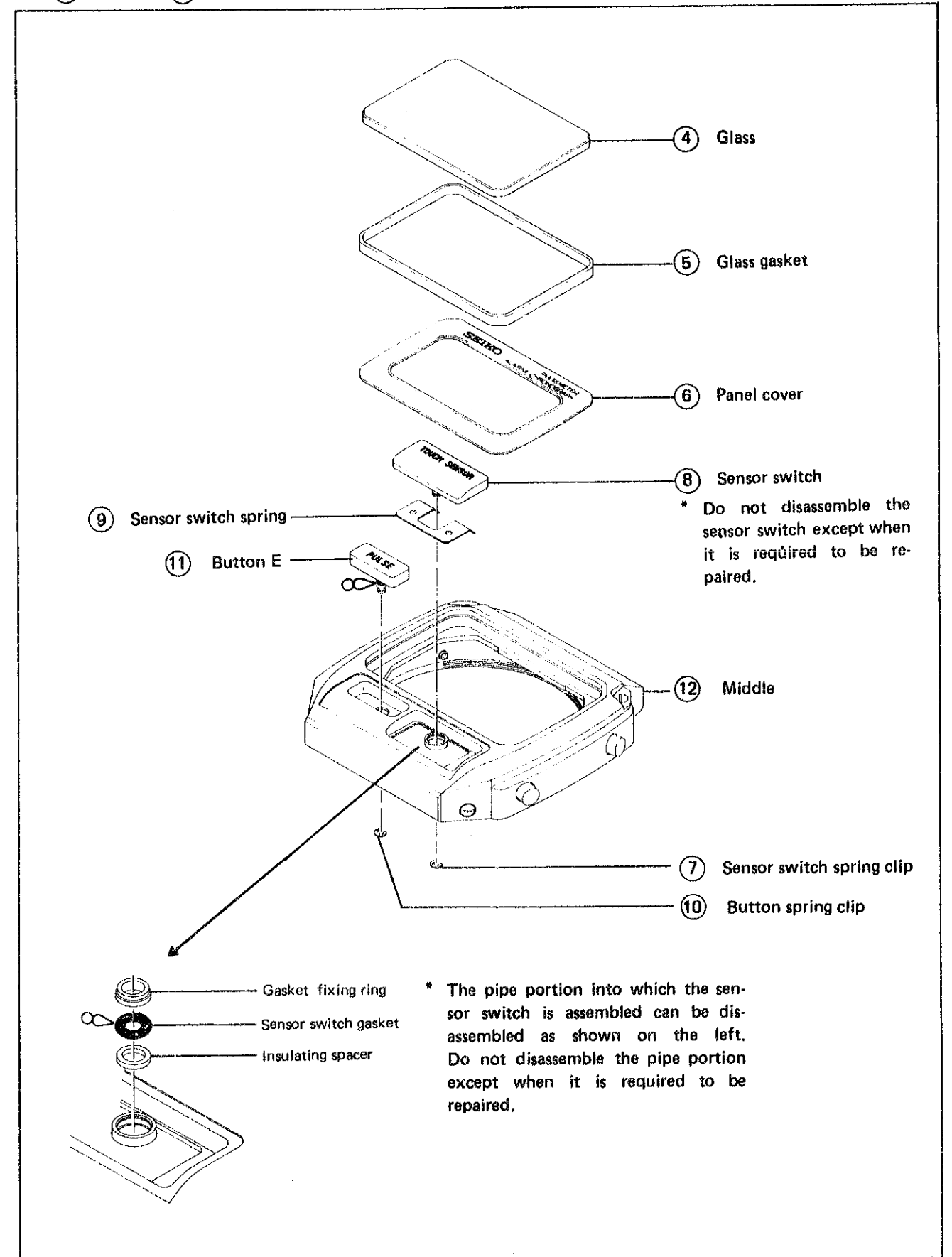
### Lubricating

Silicone grease 500,000 c.s.   
Normal quantity

• ① Case back ~ ③ Module



• ④ Glass ~ ⑪ Button E



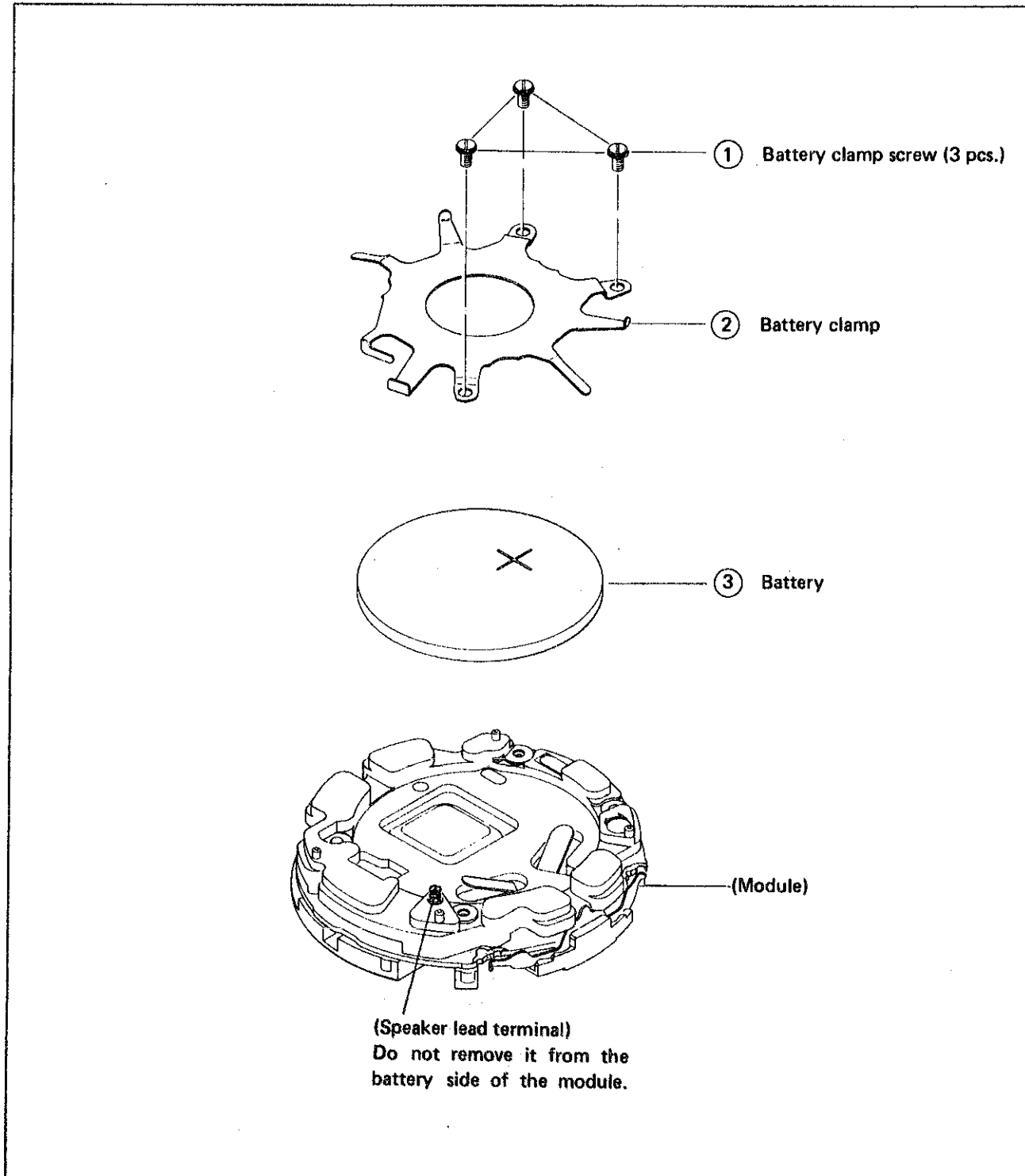
## VI. DISASSEMBLING AND REASSEMBLING OF THE MODULE

When disassembling and reassembling the module, be sure to use the static electricity protector S-830 to protect the module from static electricity.

Disassembling procedures Figs. : ① → ⑩

Reassembling procedures Figs. : ⑩ → ①

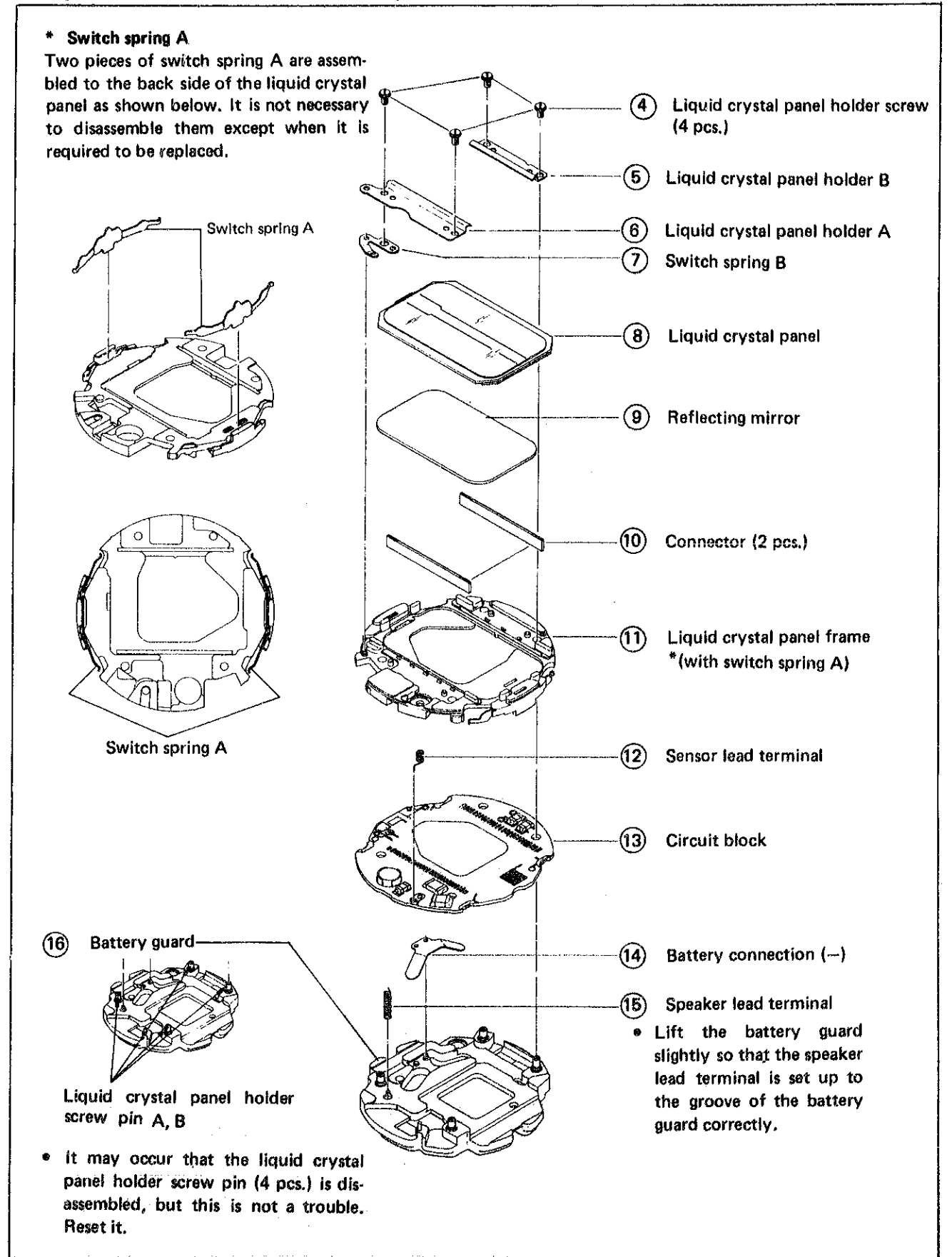
- ① Battery clamp screw ~ ③ Battery



- ④ Liquid crystal panel holder screw ~ ⑩ Battery guard

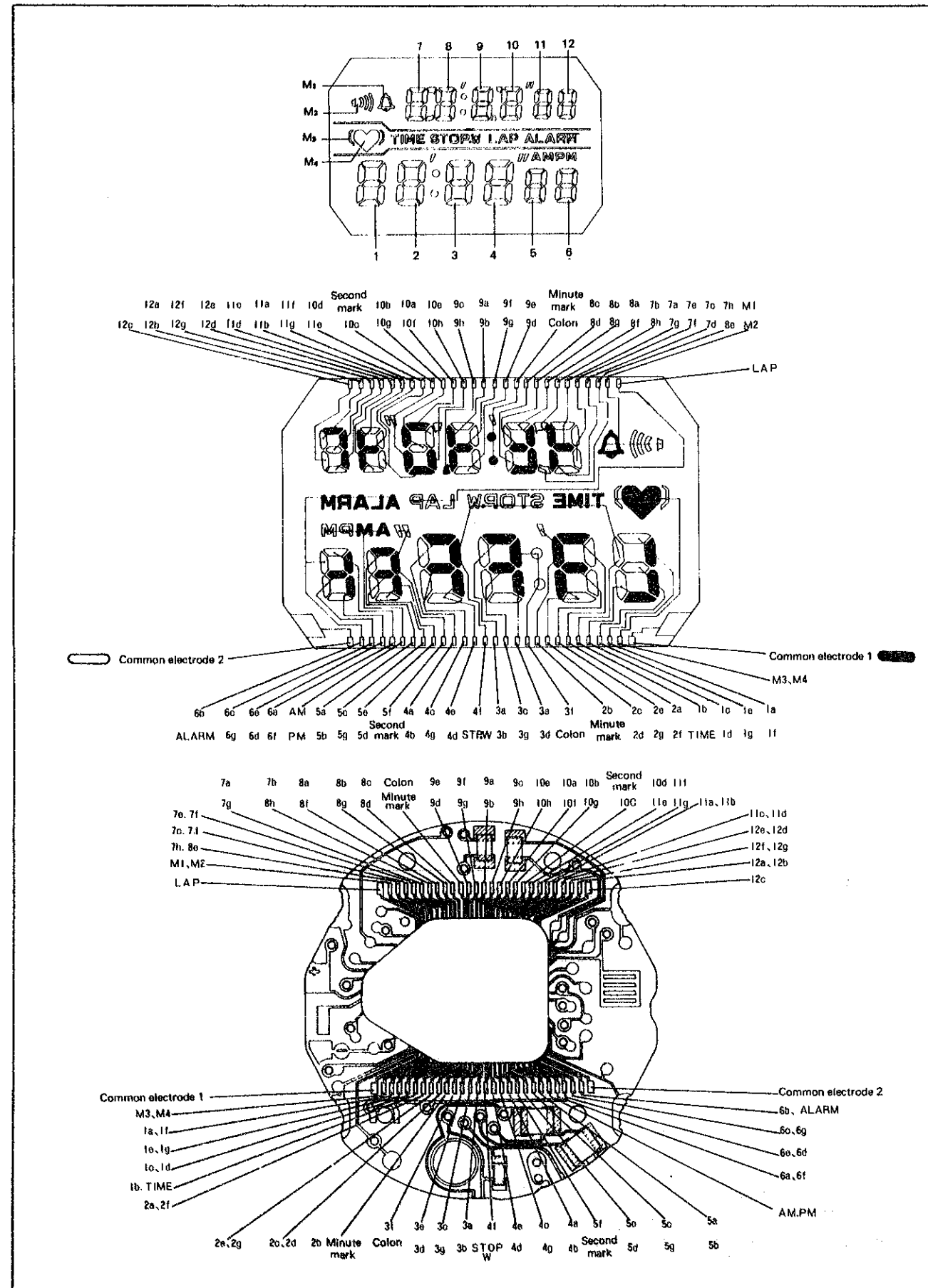
### \* Switch spring A

Two pieces of switch spring A are assembled to the back side of the liquid crystal panel as shown below. It is not necessary to disassemble them except when it is required to be replaced.





## VII. RELATIONSHIP BETWEEN THE SEGMENT (LIQUID CRYSTAL PANEL ELECTRODE) AND THE C-MOS-LSI OUTPUT TERMINAL



## VIII. CHECKING AND ADJUSTMENT

- The explanation here is only for the particular points of Cal. S229A.
- Refer to the "TECHNICAL GUIDE, GENERAL INSTRUCTION" for SEIKO Digital Quartz for details.

### Procedure

- Remarks on the replacement of the battery.

In this calibre if the display is irregular or is not shown after replacing battery, remove the battery and reinstall.

### CHECK BATTERY VOLTAGE

Volt-ohm-meter  
Range to be used: DC 6V

(When the battery is installed in the watch, the display may sometimes be irregular or may not be shown. Remove the battery and reinstall.)

### Result:

When either of SANYO and Maxell CR2016 is used:

Normal : More than 3.0V  
Defective : Less than 3.0V

When MATSUSHITA BR2016 is used:

Normal : More than 2.8V  
Defective : Less than 2.8V

### CHECK BATTERY CONDUCTIVITY

### CHECK CURRENT CONSUMPTION

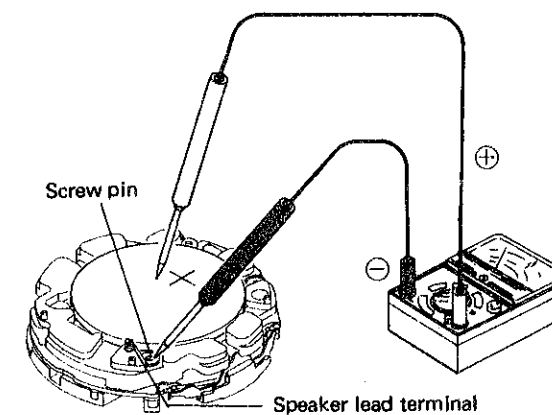
Volt-ohm-meter  
Range to be used: DC 12 $\mu$ A

### Result:

Normal : Less than 2.4 $\mu$ A  
Defective : More than 2.4 $\mu$ A

\* Replace the circuit block or liquid crystal panel with a new one.

(When the pointer does not swing, disconnect the red probe and reapply it for a more accurate measurement.)

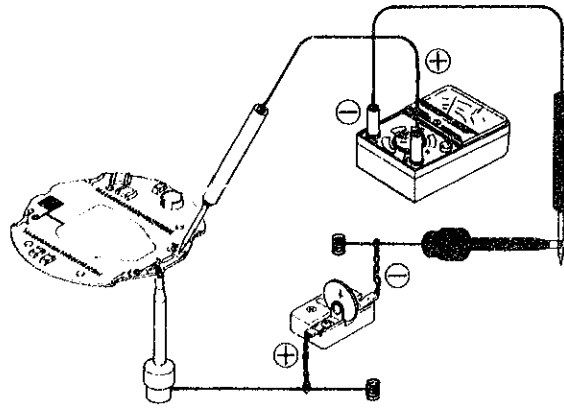


Probe red: Battery surface (+)  
Probe black: Screw pin (Located near the speaker lead terminal)

Procedure

\* How to find either of the liquid crystal panel or the circuit block should be replaced when the current consumption is more than  $2.4\mu A$ .  
Check current consumption for the circuit block alone.

**Result:**  
Normal (Circuit block): Less than  $2.2\mu A$   
Replace the liquid crystal panel.  
Defective (Circuit block): More than  $2.2\mu A$   
Replace the circuit block.



CHECK WATER RESISTANCE

CHECK CONTACT BETWEEN C-MOS-LSI AND LIQUID CRYSTAL PANEL

By referring to the "Relationship between the segment (Liquid Crystal Panel Electrode) and C-MOS-LSI output terminal on page 8, check the liquid crystal panel, connector and C-MOS-LSI output terminal for conductivity.

CHECK LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK

(1) Check the liquid crystal panel for broken wire, short, etc.

Volt-ohm-meter  
Range to be used: OHMS  $R \times 1 \sim R \times 1K$

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

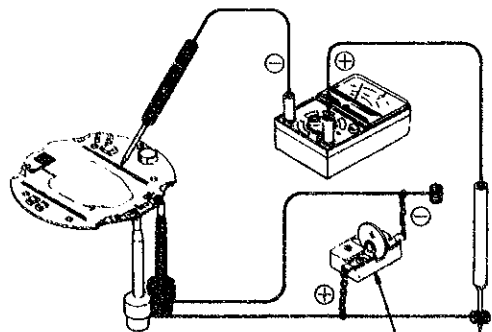
(2) Check the output voltage of the circuit block.

Volt-ohm-meter  
Range to be used: DC 3V

**Result:**  
Normal : More than 0.8V  
Defective : Less than 0.8V

Replace the circuit block with a new one.

(If the pointer does not swing, remove the red clip of the S-833 and reconnect it for a more accurate measurement.  
If the pointer still does not work then, replace the circuit block with a new one.)



Current supplier S-833

Procedure

CHECK ACCURACY

- The stopwatch display (all digits are reset to zero) will facilitate checking accuracy.

CHECK FUNCTIONING AND ADJUSTMENT

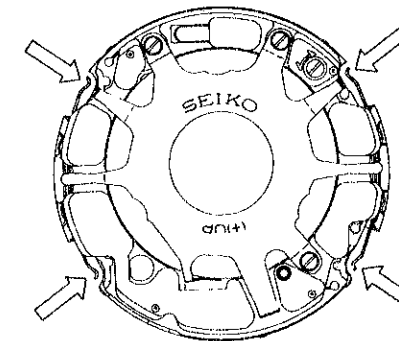
**Result:**  
Normal : Functions correctly.  
Defective : Does not function correctly.  
Replace the circuit block with a new one.

CHECK ALARM TEST

Depress buttons "C" and "D" at the same time in the time/calendar display to check if the alarm rings.

**Result:**  
Normal : Alarm rings.  
Display disappears.  
Replace the battery with a new one.  
Defective : Alarm does not ring.  
Check for alarm condition.

CHECK CONDUCTIVITY OF SWITCH COMPONENTS



\* Also check the contamination.

**Result:**  
Normal : Functions correctly.  
Defective : Does not function correctly.

Procedure

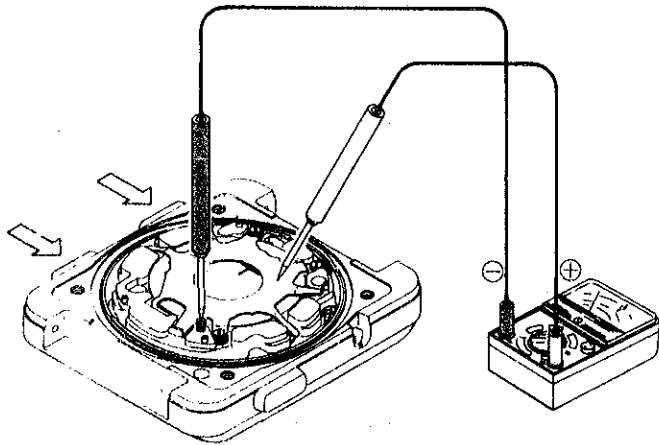
CHECK ALARM CONDITIONS

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

(1) Check the output voltage.

Volt-ohm-meter  
Range to be used: DC 3V

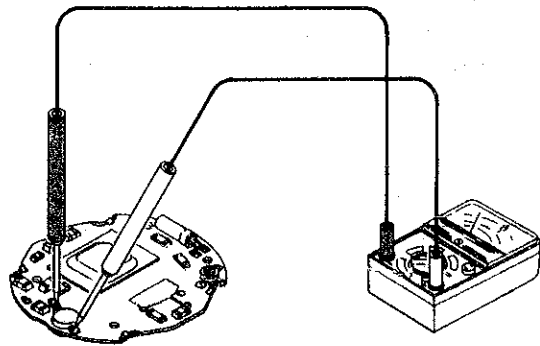
Connect the volt-ohm-meter as illustrated below and activate the alarm test system.



**Result:**  
Normal : Pointer swings.  
Defective : Pointer does not swing.  
Replace the circuit block with a new one.

(2) Check the upconverter coil.

Volt-ohm-meter  
Range to be used: OHMS R x 1



**Result:**  
Normal :  $70k\Omega \sim 90k\Omega$   
Defective —  $\left\{ \begin{array}{l} \text{Less than } 70k\Omega \text{ (Short circuit)} \\ \text{More than } 90k\Omega \text{ (Broken wire)} \end{array} \right.$   
Replace the circuit block with a new one.

(3) Check the piezoelectric element for appearance.

When there is no defect to be found through the checking methods above, check the piezoelectric element for cracks, breaks, peeling off.

CHECK BULB CONDITION

Procedure

CHECK FUNCTIONING

• When the buttons are depressed in the following order, check to see if the display changes correctly.

Button E → E → A → B → C → D

**Result:**  
Normal : Display changes correctly.  
Defective : Display does not change correctly.  
Replace the circuit block with a new one.

\* When the pulse monitoring display is not being used and the heart mark keeps flashing: The circuit block is defective.