

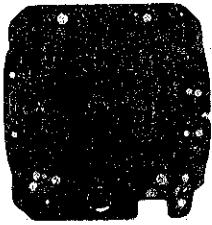
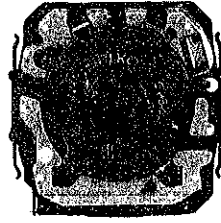
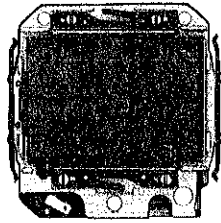
**SEIKO**

**DIGITAL QUARTZ**

**Cal. S234A**

**PARTS  
CATALOGUE**

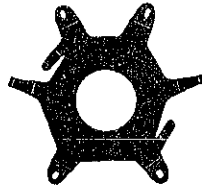
# Cal. S234A



4000 200



4219 200



4225 206



4245 203



4245 204



4245 205



4246 204



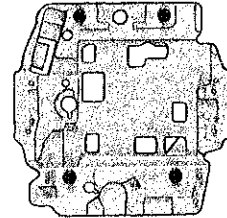
4257 200



4270 202



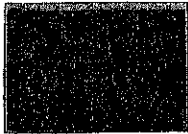
4313 203



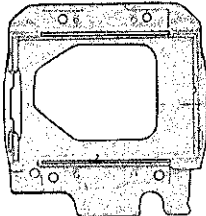
4395 200



4408 200



☆4510 068



4512 068



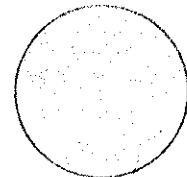
4521 068



4530 200



4540 068



4589 003



☆SEIKO CR2016



012 462



032 011

2/1

# Cal. S234A

## Characteristics

Casing diameter : 28.0 mm × 27.8 mm  
 Maximum height : 6.6 mm  
 Frequency of quartz crystal oscillator : 32,768 Hz (Hz=Hertz . . . . Cycles per second)  
 Regulation system : Trimmer condenser  
 Pulsemeter function  
 Time and calendar display  
 Alarm display  
 Stopwatch display  
 Pacemaking display  
 Hourly time signal  
 Illuminating light

PART NO.	PART NAME	PART NO.	PART NAME
4000 200	Circuit block		
4219 200	Battery connection insulator		
4225 206	Battery clamp		
4245 203	Switch spring (A)		
4245 204	Switch spring (B)		
4245 205	Switch spring (C)		
4246 204	Speaker lead terminal		
4257 200	Anti-static electricity plate		
4270 202	Battery connection (-)		
4313 203	Connector		
4395 200	Battery guard		
4408 200	Bulb holder		
☆4510 068	Liquid crystal panel		
4512 068	Liquid crystal panel frame		
4521 068	Reflecting mirror		
4530 200	Bulb		
4540 068	Liquid crystal panel holder		
4589 003	Piezoelectric element		
012 462	Liquid crystal panel holder screw		
012 462	Battery clamp screw		
032-011	Tube for liquid crystal panel holder screw		
☆SEIKO CR2016 ☆Maxell CR2016 ☆Sanyo CR2016 ☆Matsushita BR2016	Lithium battery		

## Remarks :

### Liquid crystal panel

☆4510 068 . . . . . Be sure that combination between the color of panel cover and liquid crystal panel should be matched according to the "SEIKO Quartz Casing Parts Catalogue".

### Battery

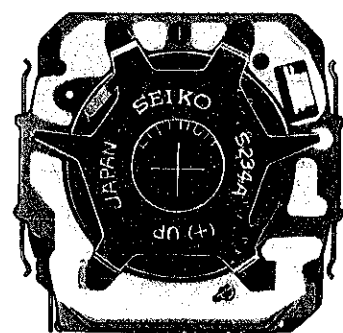
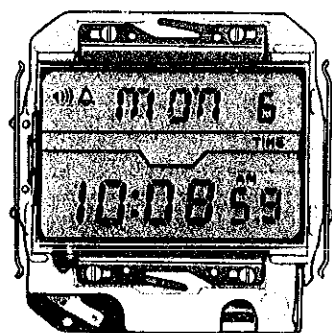
☆ SEIKO CR2016  
 ☆ Maxell CR2016  
 ☆ Sanyo CR2016  
 ☆ Matsushita BR2016

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

# TECHNICAL GUIDE

## SEIKO DIGITAL QUARTZ

CAL. S234A



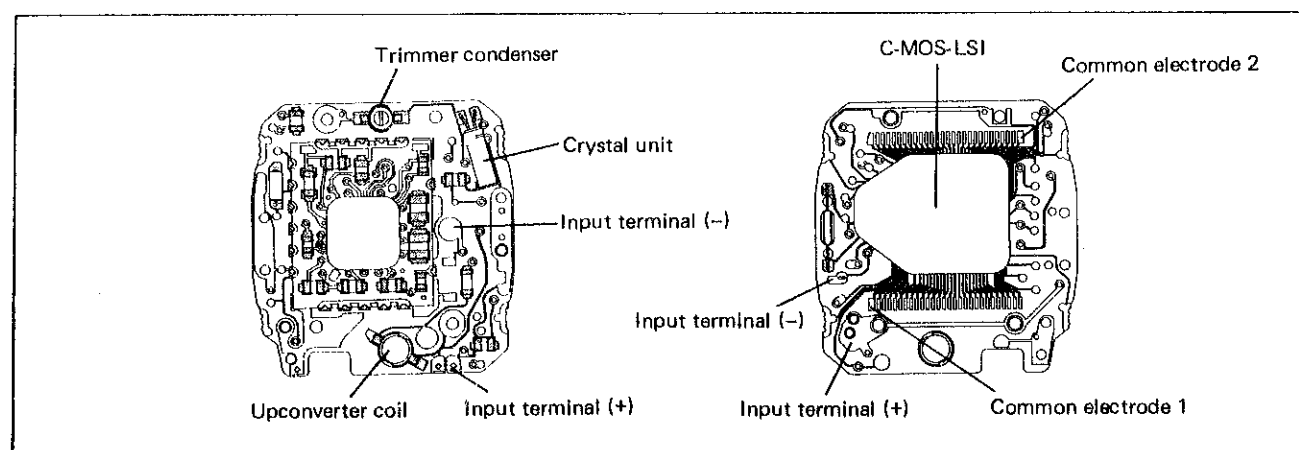
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## I. SPECIFICATIONS

Item	Cal. No.	S234A
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 (Rings for 20 seconds.)</li> <li>• Stopwatch display (up to 24 hours)</li> <li>• Pace-making display (Range of the pace sound to be set: 5~299 times/min.)</li> <li>• Pulsemeter display (Pulse frequency display: 30 ~ 210 beats/min.)</li> </ul>	
Additional mechanism	<ul style="list-style-type: none"> <li>• Pulse alarm sound</li> <li>• Pace sound</li> <li>• Hourly time signal</li> <li>• Alarm test system</li> <li>• All segments light up system</li> <li>• Illuminating light</li> <li>• Function changeover confirmation sound ("beep")</li> </ul>	
Loss/gain	Monthly rate at normal temperature range: less than 15 seconds	
Movement size	Outside diameter	28.0 mm between 6 o'clock and 12 o'clock sides 27.8 mm between 3 o'clock and 9 o'clock sides
	Height	6.5 mm without battery
Regulation system	Trimmer condenser	
Measuring gate by quartz tester	Any gate is available.	
Battery	Lithium battery SEIKO (SEIZAIKEN) CR2016, Maxell CR2016, Sanyo CR2016, Matsushita BR2016 Battery life is approximately 2 years. (if the pulsemeter function is used for 10 minutes a day, the pace-making function for 5 minutes a day, the illuminating light for 5 seconds a day, and the alarm for 20 seconds a day.) Voltage: 3.0V	

## II. STRUCTURE OF THE CIRCUIT BLOCK

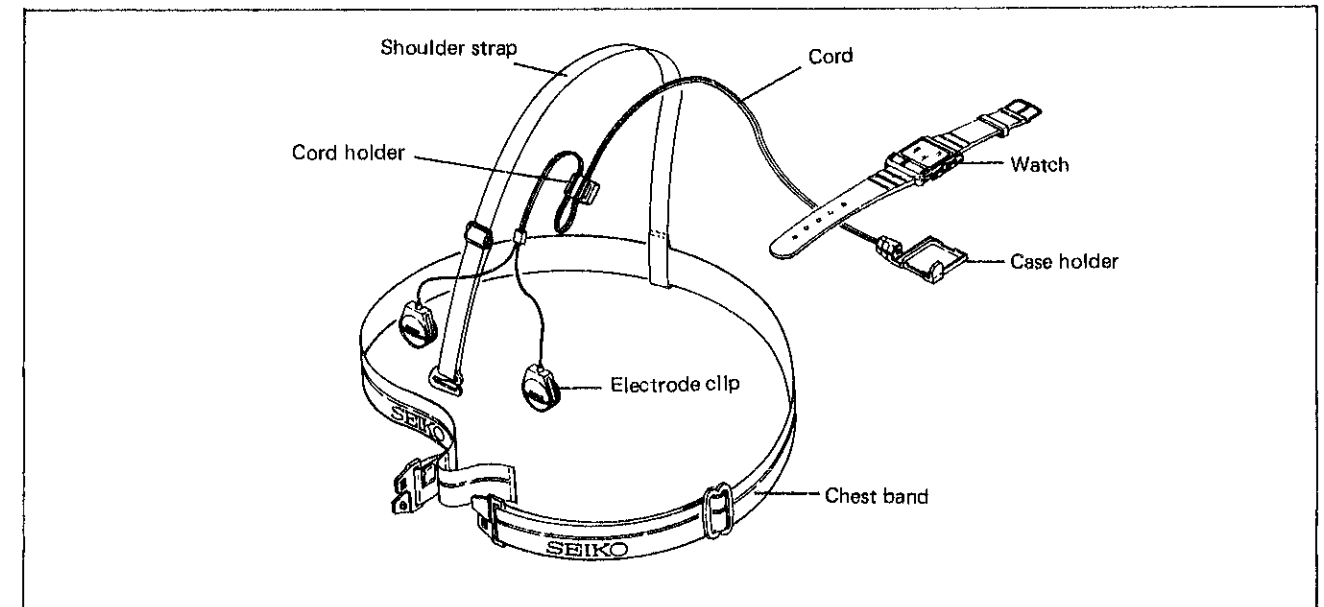


## III. ATTACHMENTS

By using the attachments, the pulse rate can be measured while moving.

Set the case holder to the watch, then put the chest band around the chest touching the skin surface, and fix the electrode clips to the chest band so that they are 2 to 3 cm below the nipples of the right and left breasts.

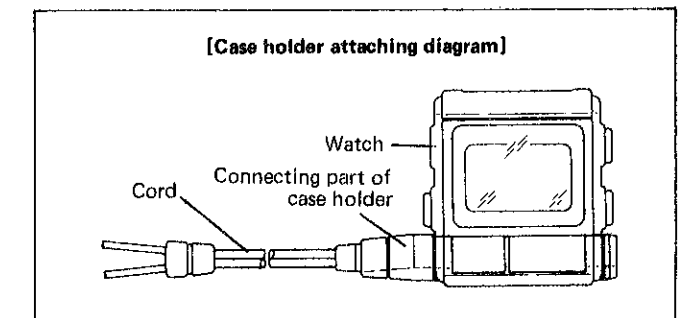
### 1. Names of the attachments



### 2. How to attach and remove the case holder

#### • How to attach the case holder

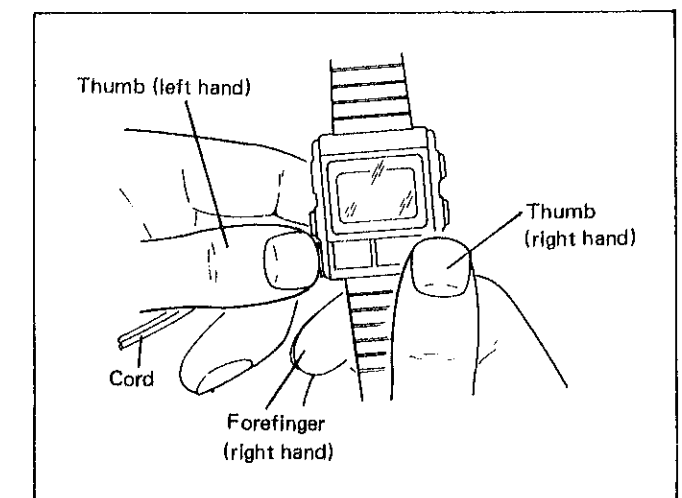
First, fix the connecting part of the case holder to the 9 o'clock side of the watch case, and then push the watch case at the 3 o'clock side by hand to set the case holder in position correctly.



#### • How to remove the case holder

1. Hold the connecting part of case holder with the thumb and the forefinger of the left hand as illustrated on the right.
2. Hold the strap with the right hand and remove the connector in such a manner as to squeeze the watch upward with the forefinger of the right hand.

\* Be careful not to apply excessive pressure onto the connecting part of case holder.



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

Disassembling procedures Figs.: ① → ⑩

Reassembling procedures Figs.: ⑩ → ①

#### Lubricating:

● Silicon grease 500,000 c.s.  
Normal quantity

#### 1. Case back screw ~ Speaker lead terminal

Ex.: Case No. S234-5000

#### ① Case back screw (4 pcs.)

#### Remarks on disassembling

Tighten all of the four case back screws first temporarily and then securely, following one after another in a diagonal line.

#### ② Case back

Be careful not to install it upside down.

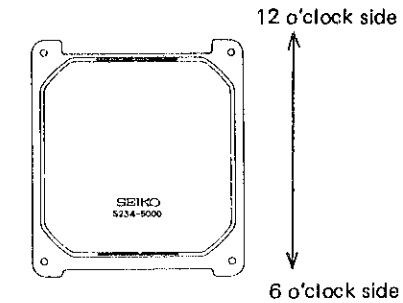
(Piezoelectric element)

#### ③ Inner case

#### Remarks on reassembling

The inner case provides a protrusion and a guide hole in a corner. Install the inner case to the middle so that the protrusion is set at the 7 o'clock corner position and the hole catches the middle's pin.

Guide hole  
Protrusion



#### ④ Case back gasket

#### ⑤ Speaker lead terminal

Be careful not to lose the speaker lead terminal, as it is not fixed to the module.

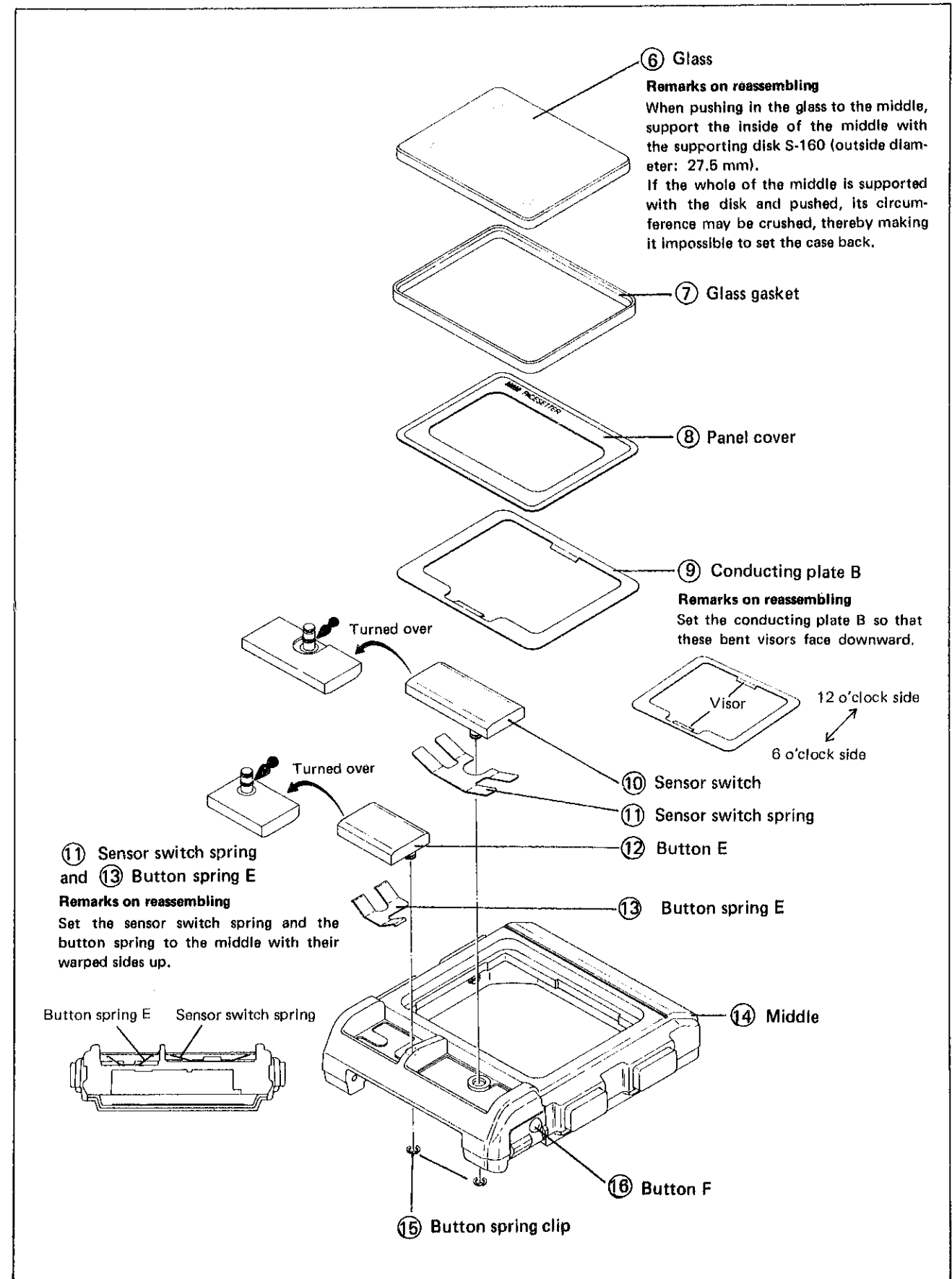
(Module)

(Middle)

(Conducting plate A)  
It is fixed to the middle.

Pin

#### 2. Glass ~ Button F



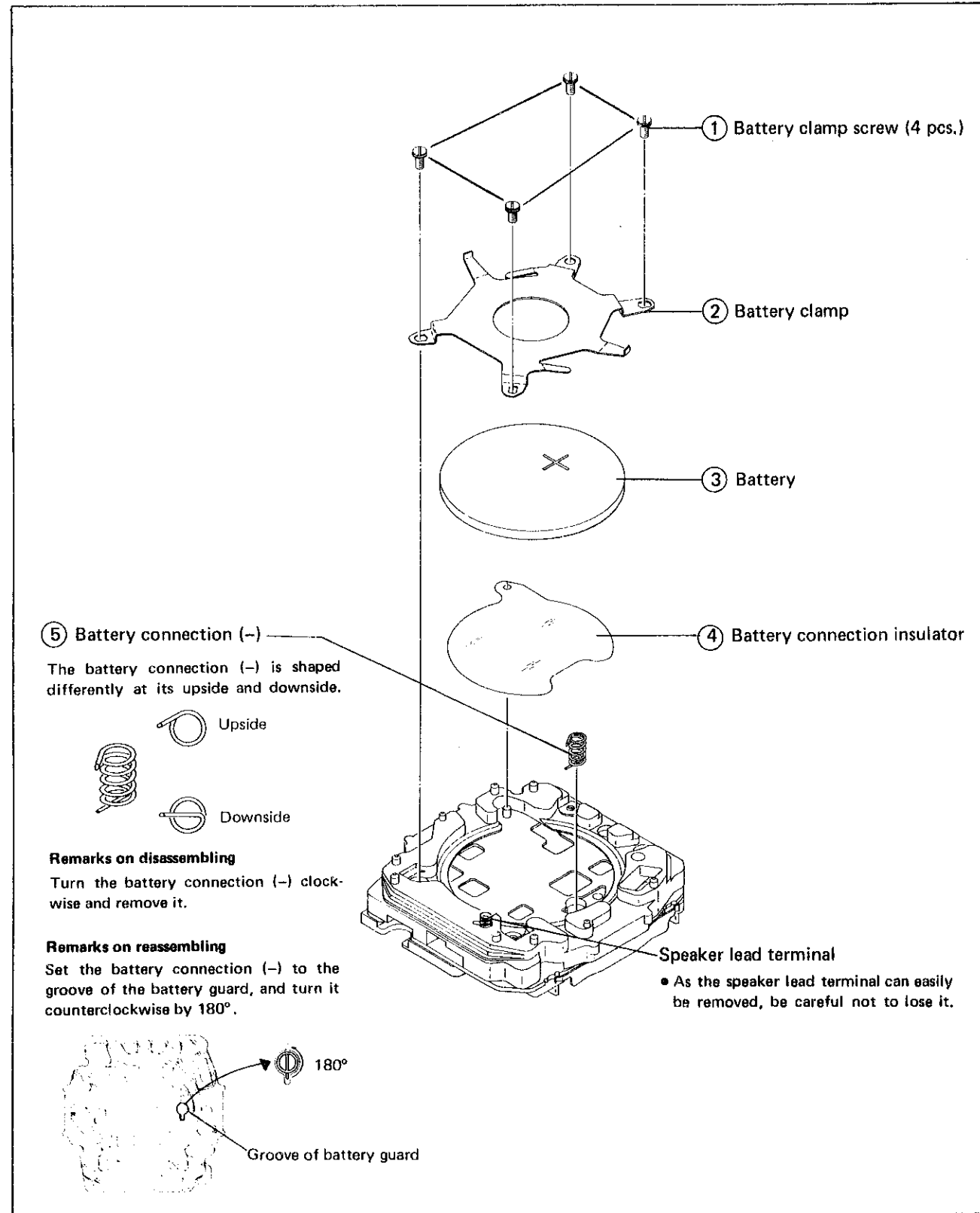
## V. DISASSEMBLING AND REASSEMBLING OF THE MODULE

Be sure to use the static electricity protector S-830.

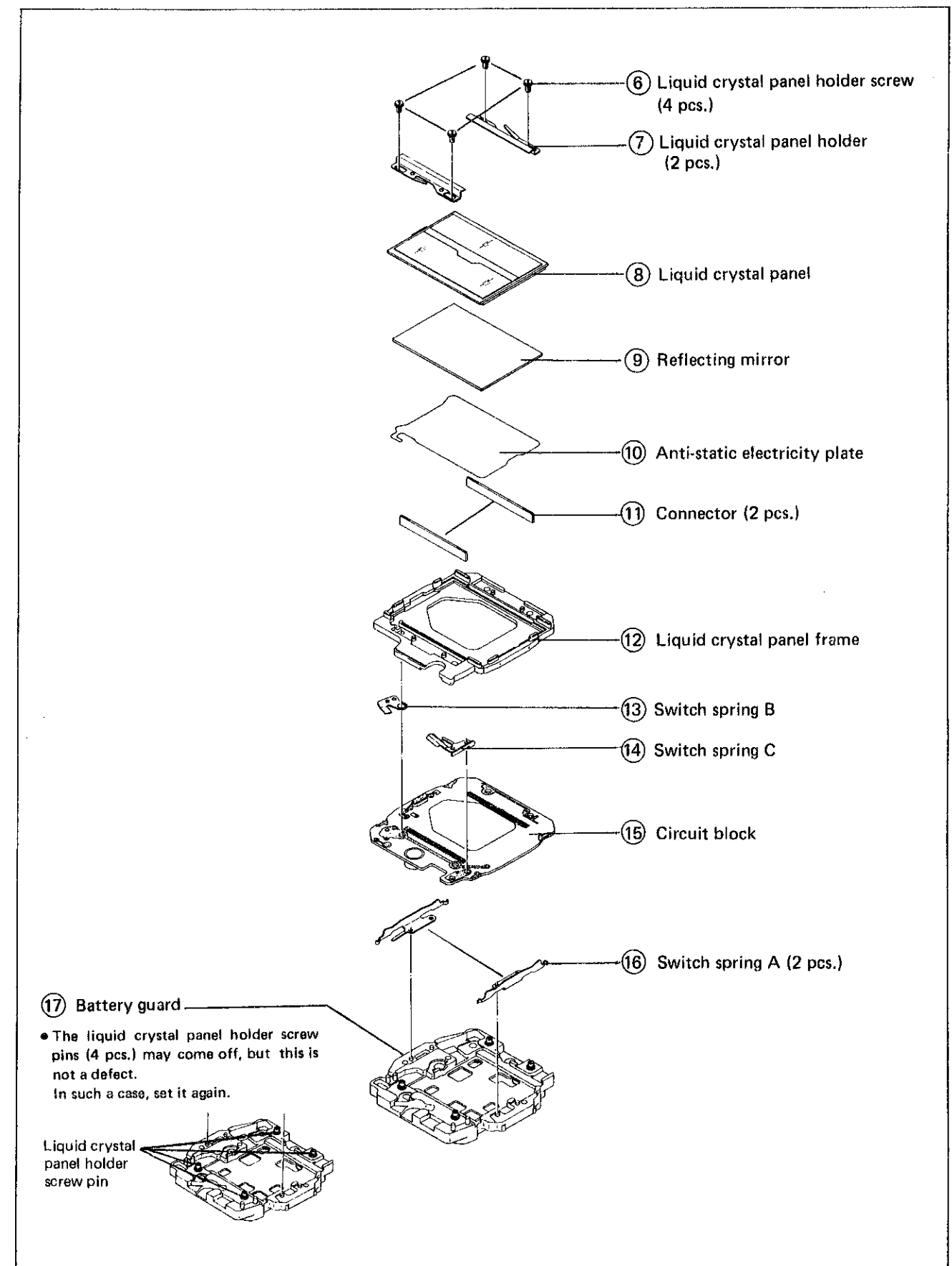
Disassembling procedures Figs.: ① → ⑱

Reassembling procedures Figs.: ⑱ → ①

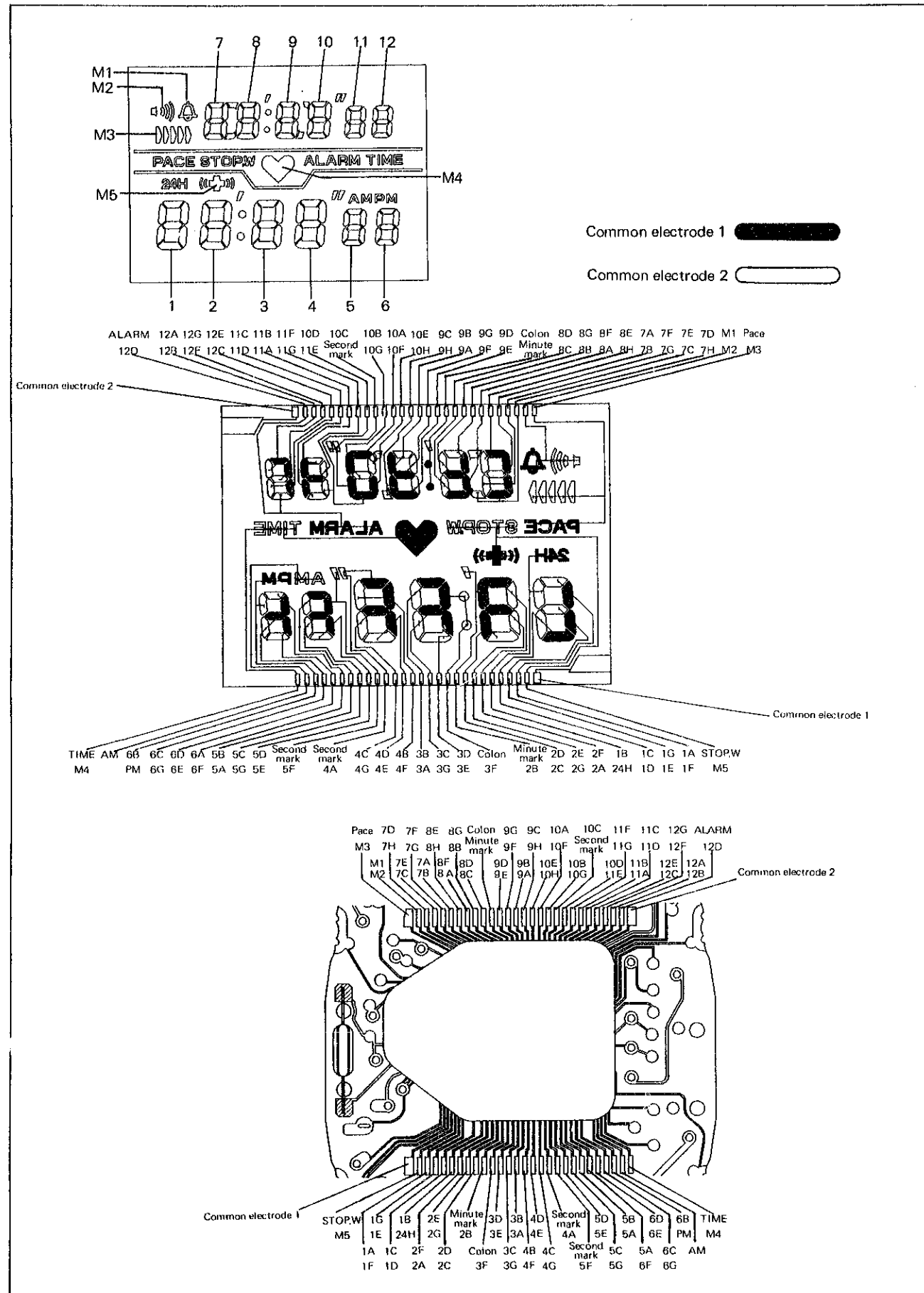
### 1. Battery clamp screw ~ Battery connection (-)



### 2. Liquid crystal panel holder screw ~ Battery guard



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



## VII. CHECKING AND ADJUSTMENT

- The explanation here is only for the particular points of Cal. S234A. Refer to the "TECHNICAL GUIDE, GENERAL INSTRUCTION" for SEIKO Digital Quartz for details.

### Procedure

#### Remarks on replacing battery

When the battery is installed in the watch, be sure to push buttons A, B, C, and D simultaneously to see that the watch shows "12:00oo".

#### CHECK BATTERY VOLTAGE

Use the Digital Multi-Tester S-840.

Mode to be used: DC V

Before starting measurement, short-circuit the probes to see that the Digital Multi-Tester displays "AUTO 00.0mV" or "AUTO 00.1mV".

#### Result:

When any of SEIKO (SEIZAIKEN) CR2016, Sanyo CR2016, and Matsushita CR2016 is used:

Normal : More than 2.9V

Defective: Less than 2.9V

When Matsushita BR2016 is used:

Normal : More than 2.8V

Defective: Less than 2.8V

(The battery voltage varies slightly, depending on the kinds of battery. But they do not affect the functions of the watch.)

#### Note:

After checking battery voltage, push buttons A, B, C, and D simultaneously to see that the watch shows "12:00oo".

#### CHECK BATTERY CONDUCTIVITY

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

Referring to the "RELATIONSHIP BETWEEN THE SEGMENT (LIQUID CRYSTAL PANEL ELECTRODE) AND THE C-MOS-LSI OUTPUT TERMINAL", check for poor conductivity of the liquid crystal panel, connector, and C-MOS-LSI output terminal.



Procedure

**CHECK LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK**

(1) Check to see if there is any broken wire or short circuit in the liquid crystal panel.

Use the Digital Multi-Tester S-840.

Mode to be used:  $\Omega$

Result:

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

(2) Check to see if the electric signal is correctly transmitted from the circuit block.

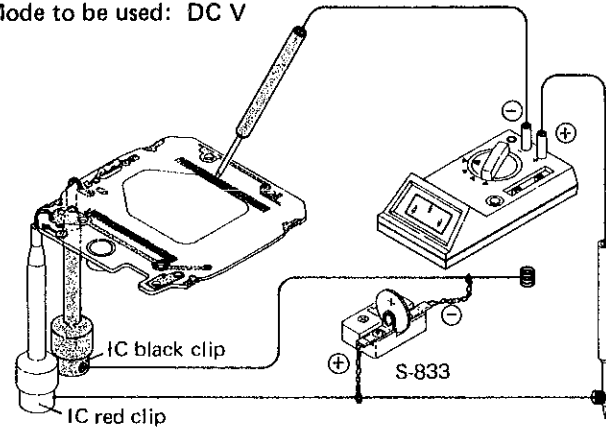
Use the Digital Multi-Tester S-840.

(Use a lithium battery, SEIKO (SEIZAIKEN) CR2016, Sanyo CR2016, Maxell CR2016 or Matsushita BR2016.)

Mode to be used: DC V

Result:

Normal : More than 1.2V  
 Defective: Less than 1.2V  
 Replace the circuit block with a new one.

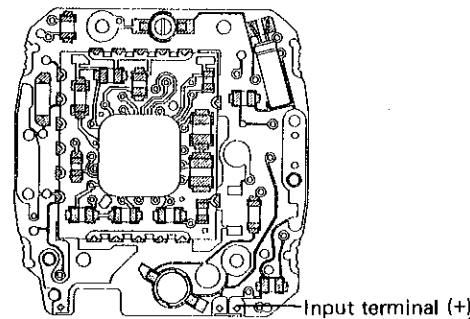


When the Volt-Ohm-Meter S-831 is used for checking:

Result:

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

Input terminal (+) may be clipped on the back of the circuit block with the IC red clip.



**CHECK ALL THE SEGMENTS LIT UP**

Check to see if all the segments light up by pressing button B for 4 to 5 seconds in any display other than the pulse monitoring display. This can be released by pressing any of buttons A, B, C, D and E.

**CHECK CONDUCTIVITY OF SWITCH COMPONENTS**

Check to see if the switch components operate normally.

Procedure

**CHECK CURRENT CONSUMPTION**

Use the Digital Multi-Tester S-840 and the Multi-Adapter MA-40.

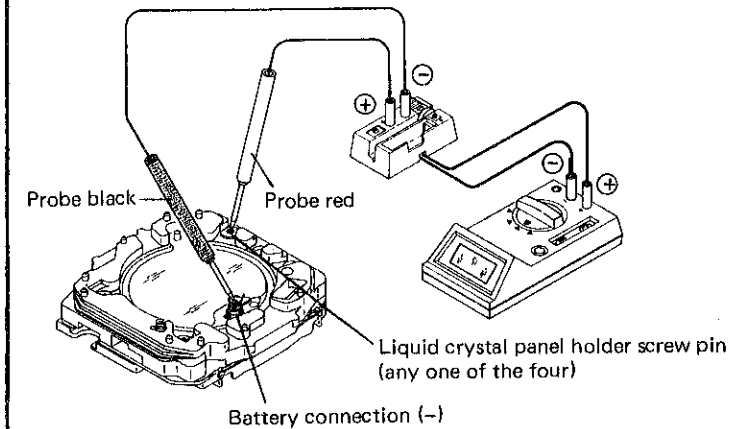
Mode to be used:  $\mu A$

• Read the measured value after pressing the reset switch to reset the display to "00.0mA".

(Use a lithium battery, SEIKO (SEIZAIKEN) CR2016, Sanyo CR2016, Maxell CR2016 or Matsushita BR2016.)

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.

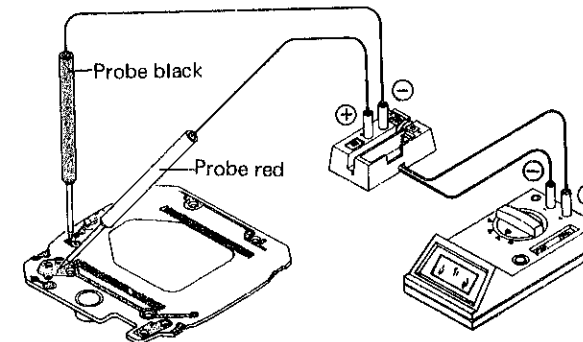


\* How to find defects when the current consumption is more than  $2.4\mu A$

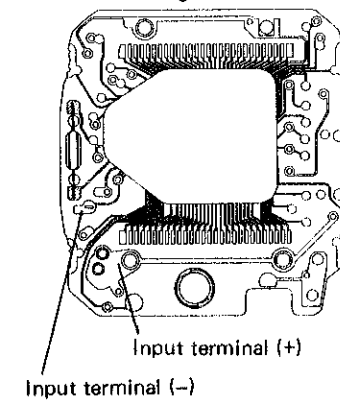
Check current consumption for the circuit block alone.

Result:

Normal : Less than  $2.2\mu A$   
 Replace the liquid crystal panel with a new one.  
 Defective: More than  $2.2\mu A$   
 Replace the circuit block with a new one.



Enlarged



Procedure

**CHECK ALARM TEST SYSTEM**

In the time and calendar display, check to see if the alarm rings by pressing buttons C and D at the same time.

- Result:**  
 Normal : The alarm rings.  
           The display disappears.  
 Defective { Replace the battery with a new one.  
           The alarm does not ring.  
           Proceed to the procedure CHECK ALARM CONDITION.

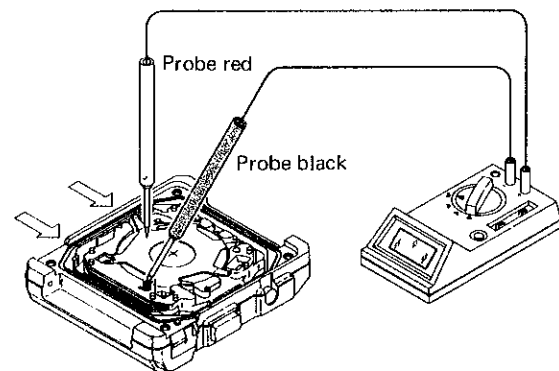
**CHECK ALARM CONDITION**

When the alarm does not ring, go through this procedure.

(1) Check to see if the alarm signal is correctly transmitted from the circuit block.

Use the Digital Multi-Tester S-840. Mode to be used: DC V

Connect the Digital Multi-Tester as illustrated below and activate the alarm test system by pressing buttons C and D at the same time.

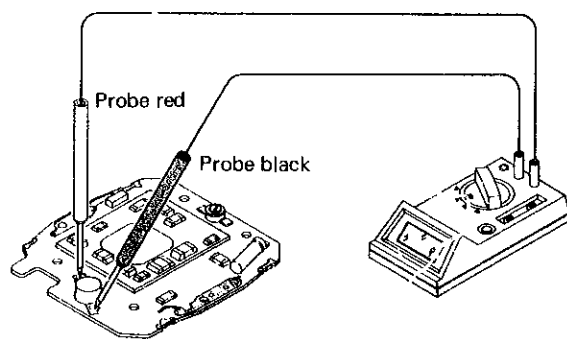


- Result:**  
 Normal : The output voltage is displayed intermittently.  
 Defective: The digits displayed remain "00.0V".  
           Replace the circuit block with a new one.

(2) Check the upconverter coil.

Use the Digital Multi-Tester S-840. Mode to be used:  $\Omega$

Before starting measurement, short-circuit the probes to see that the Digital Multi-Tester displays "AUTO 00.2 ~ 00.4 $\Omega$ " with the buzzer beeping.



- Result:**  
 Normal : 140 $\Omega$  ~ 160 $\Omega$   
 Defective { Less than 140 $\Omega$  (Short circuit)  
           More than 160 $\Omega$  (Broken wire)  
           Replace the circuit block with a new one.

Procedure

(3) Check the appearance of the piezoelectric element.  
 When there is no defect to be found through the checking methods above, check the piezoelectric element to see if there is any crack, chip, peeling, or the like on it.

**CHECK BULB CONDITION**

**CHECK ACCURACY**

The daily rate can be measured easily when all the segments are lit up.

Press button B for 4 to 5 seconds in the displays other than the pulse monitoring display, and all the segments light up. It can be released by pressing any of buttons A, B, C, D and E.

**CHECK FUNCTIONING AND ADJUSTING**

- Result:**  
 Normal : Activated correctly.  
 Defective: Not activated correctly.  
           Proceed to CHECK CIRCUIT BLOCK and CHECK CONDUCTIVITY OF SWITCH COMPONENTS.

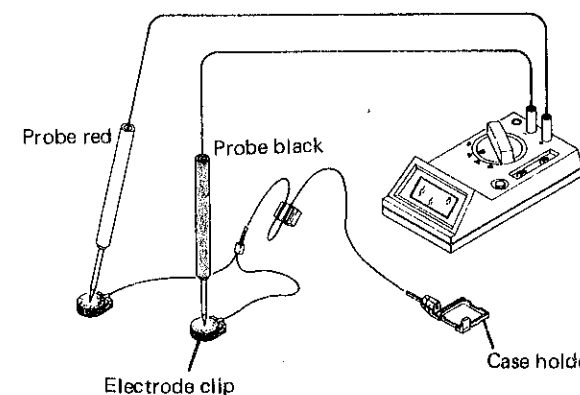
**CHECK WATER RESISTANCE**

**CHECK ATTACHMENT**

Check the electric resistance between the case holder and the electrode clip.

Use the Digital Multi-Tester S-840.

Mode to be used:  $\Omega$



Before starting measurement, short-circuit the probes to see that the Digital Multi-Tester displays "AUTO 00.2 ~ 00.4 $\Omega$ " with the buzzer beeping.

- Result:**  
 Normal : 160K $\Omega$  ~ 240K $\Omega$   
 Defective { Less than 160K $\Omega$  (Short circuit)  
           More than 240K $\Omega$  (Broken wire)  
           Replace the connector with electrode clip, with a new one.