

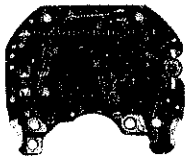
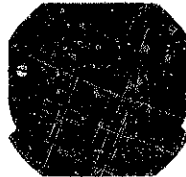
**SEIKO**

**DIGITAL QUARTZ**

**Cal. F231A**

**PARTS LIST**

# Cal. F231A



4001 326



4216 326



4242 085



4245 322



4245 323



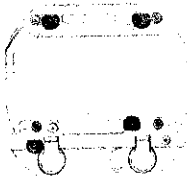
4270 326



☆4313 191



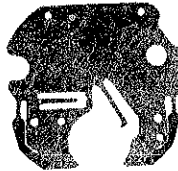
4398 328



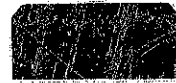
4398 329



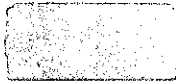
4446 320



4457 320



☆4510 271



☆4521 194



☆SEIKO TR721SW

T	U	H	
012 166	017 194	017 195	2/1

# Cal. F231A

## Characteristics

Casing diameter :  $\phi$  26.0 mm  
 Maximum height : 2.5 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 "AM"/"PM".  
 Calendar display : Digital Display System showing date and day of the week.  
 (Month is displayed only when the calendar digits are adjusted.)  
 Display medium : Nematic Liquid Crystal, FE-Mode  
 Regulation system : Trimmer condenser  
 Battery life indicator : All the digits in the display begin flashing.

PART NO.	PART NAME	PART NO.	PART NAME
4001 326	Circuit block		
4216 326	Battery connection insulator		
4242 085	Switch spring lead terminal		
4245 322	Switch spring (A)		
4245 323	Switch spring (B)		
4270 326	Battery connection (-)		
☆4313 191	Connector		
4398 328	Conductive connector frame		
4398 329	Liquid crystal panel frame		
4446 320	Crystal unit cushion		
4457 320	Circuit block cover with switch spring		
☆4510 271	Liquid crystal panel		
☆4510 272			
☆4521 194	Reflecting mirror (Glossy)		
☆4521 195	Reflecting mirror (Cross-stripe)		
012 166	Screw for circuit block cover		
012 166	Switch spring lead terminal fixing screw		
017 194	Tube for circuit block guard screw		
017 195	Guide pin		
☆SEIKO TR721SW	Silver peroxide battery		
☆SEIKO SB-DK			

### Remarks :

#### Connector

☆4313 191 ..... There are two connectors designated by the same number, which have different patterns on their sides. However they are interchangeable.

#### Liquid crystal panel and Reflecting mirror

☆4510 271 }  
 ☆4510 272 } ..... Be sure that the combination between the color of panel cover, liquid crystal panel and  
 ☆4521 194 } reflecting mirror should be matched according to the "SEIKO Quartz Casing Parts List"  
 ☆4521 195 }

#### Battery

☆SEIKO TR721SW } ..... The applied battery for this calibre might be added the substitutive in the future. In that  
 ☆SEIKO SB-DK . } case, please refer to separate "BATTERIES FOR SEIKO QUARTZ WATCHES".

☆⇨ Please see remarks.

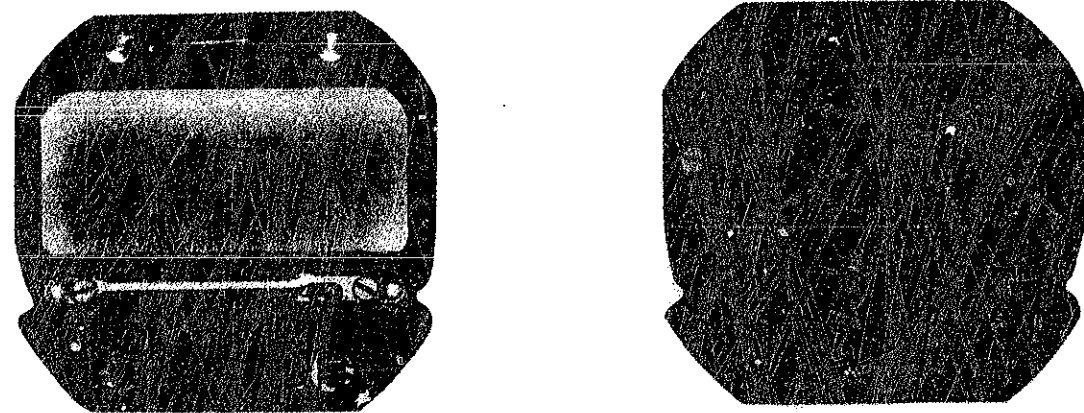
Part numbers in light letters are not shown in photos.

# TECHNICAL GUIDE

## SEIKO

# DIGITAL QUARTZ

CAL. F231 A



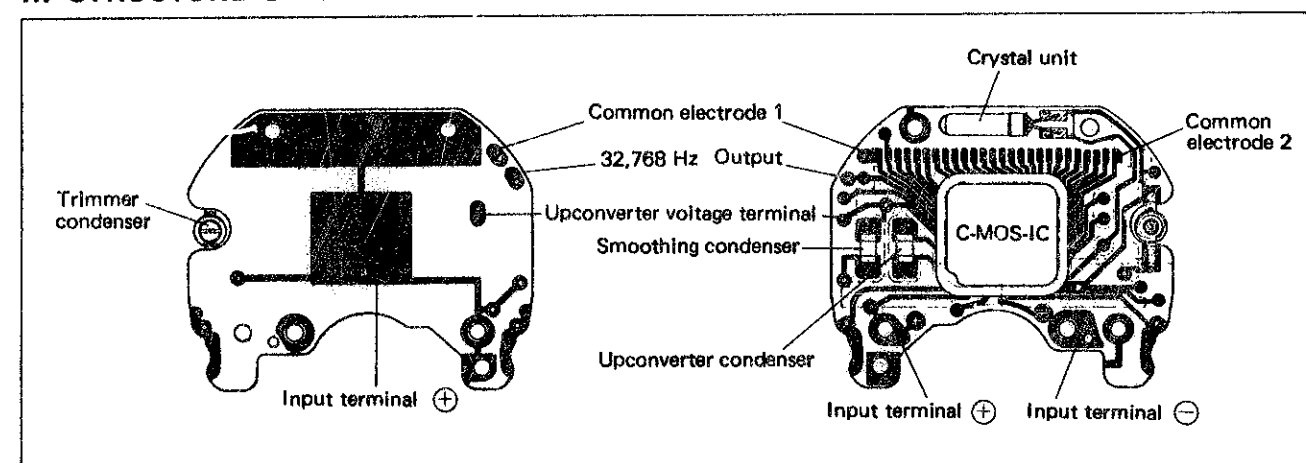
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## I. SPECIFICATIONS

Item	Cal. No.	F231A
Display medium		Nematic Liquid Crystal, FEM (Field Effect Mode)
Liquid crystal driving system		Multiplex driving system
Display system		<p>Three-function changeover system with time, calendar and time/calendar setting function.</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 when 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 display is adjusted.</li> <li>• Time/calendar setting function: Setting of 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 start flashing when the battery life nears its end.)
Loss/gain at normal temperature range		Monthly rate : less than 15 seconds (Annual rate : less than 3 minutes)
Casing diameter		φ26.0mm (22.5mm between 6 o'clock and 12 o'clock sides; 24.0mm between 3 o'clock and 9 o'clock sides)
Height		2.5mm without battery
Operational temperature range		-10°C ~ +60°C (14°F ~ 140°F)
Regulation system		Trimmer condenser
Measuring gate by Quartz Tester		Any gate is available.
Battery power		SEIKO TR721SW or SB-DK Battery life is approximately 2 years. Voltage: 1.55V
IC (Integrated Circuit)		C-MOS-IC . . . . . 1 piece

## II. STRUCTURE OF CIRCUIT BLOCK



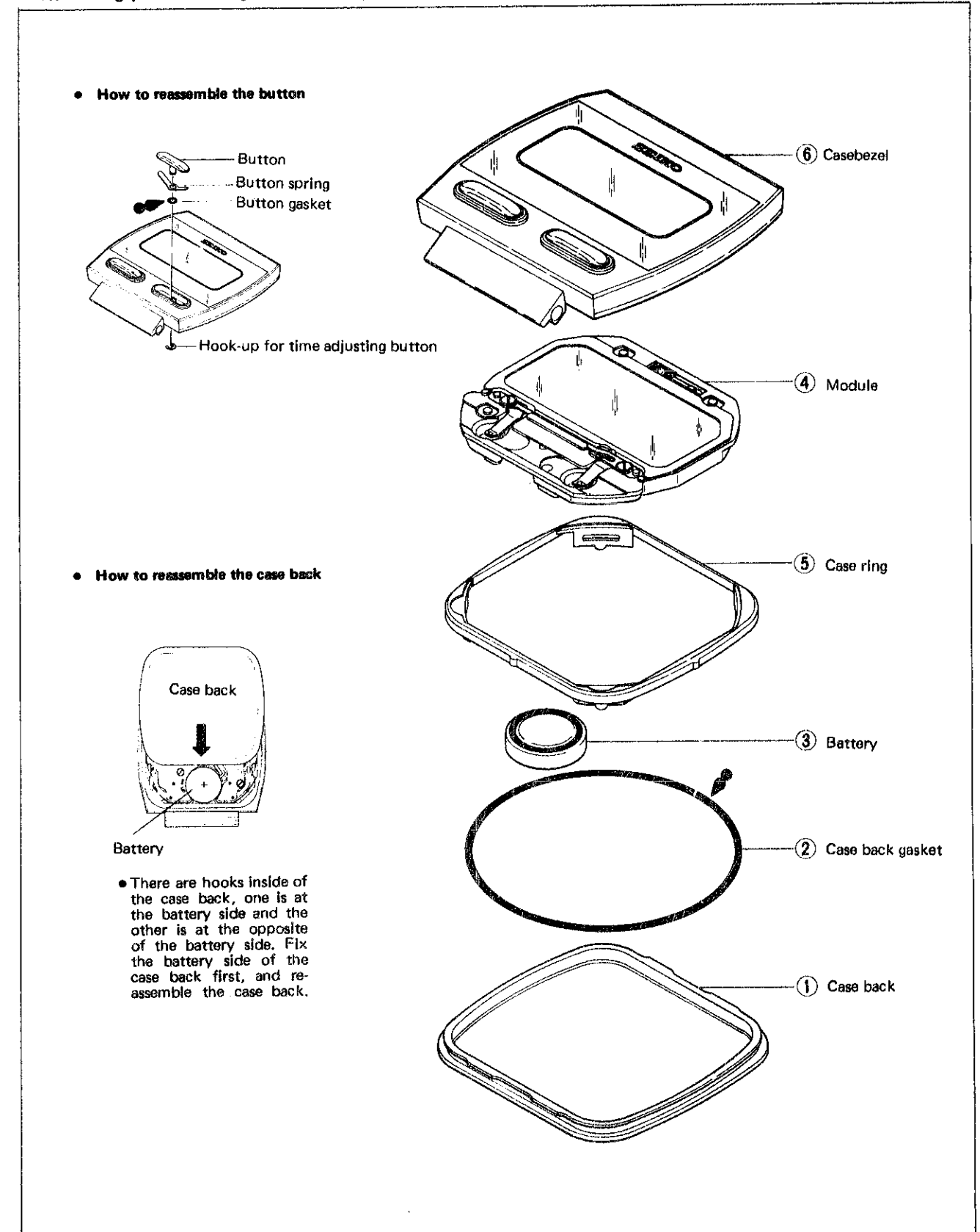
## III. DISASSEMBLING, REASSEMBLING AND LUBRICATING

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

Disassembling procedures Figs. ① → ⑥

Lubricating: Silicone grease 500,000 c.s.  
Normal quantity

Reassembling procedures Figs. ⑥ → ①



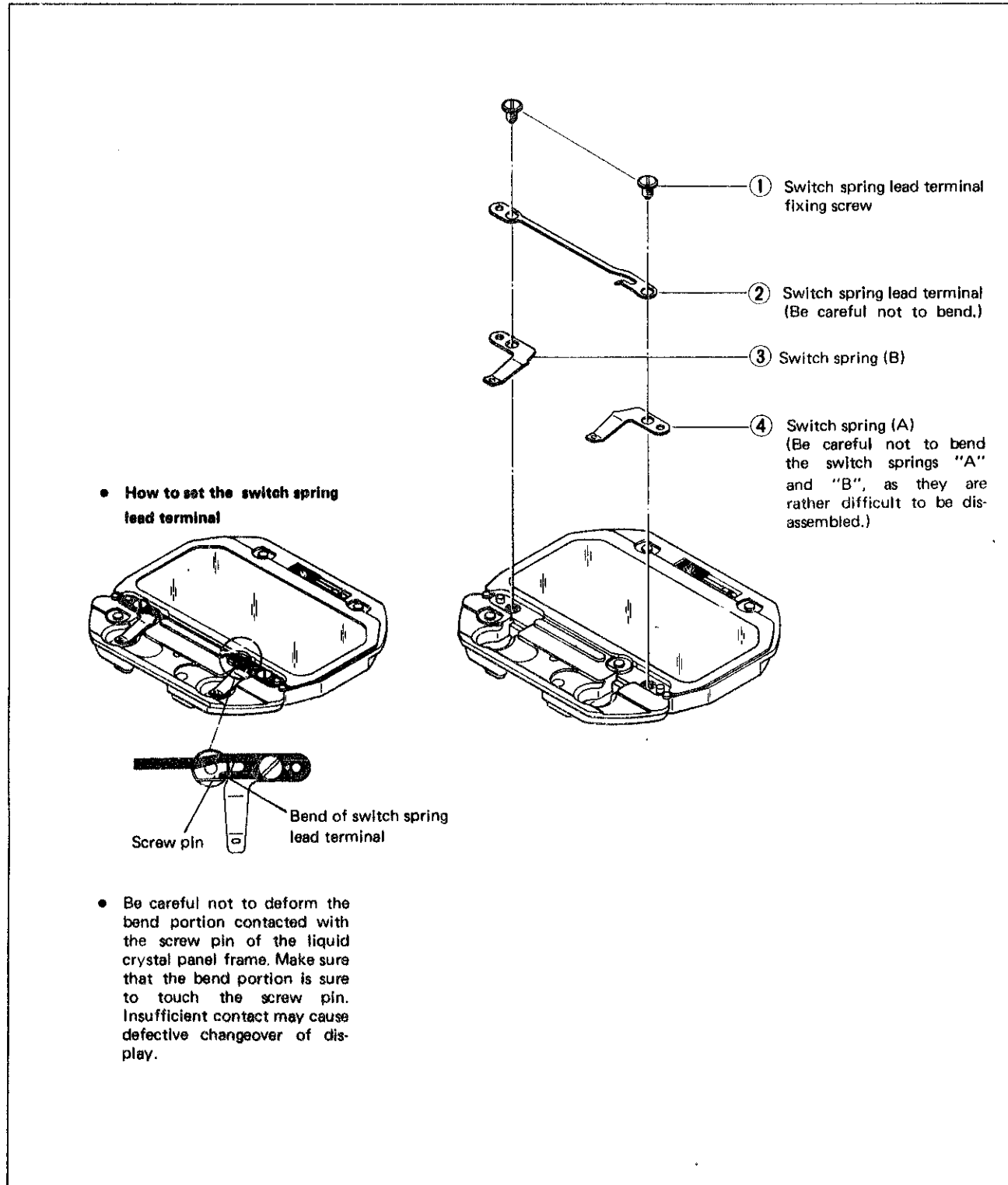
## 2. Disassembling and reassembling of the module

Disassembling procedures Figs. ① → ⑮

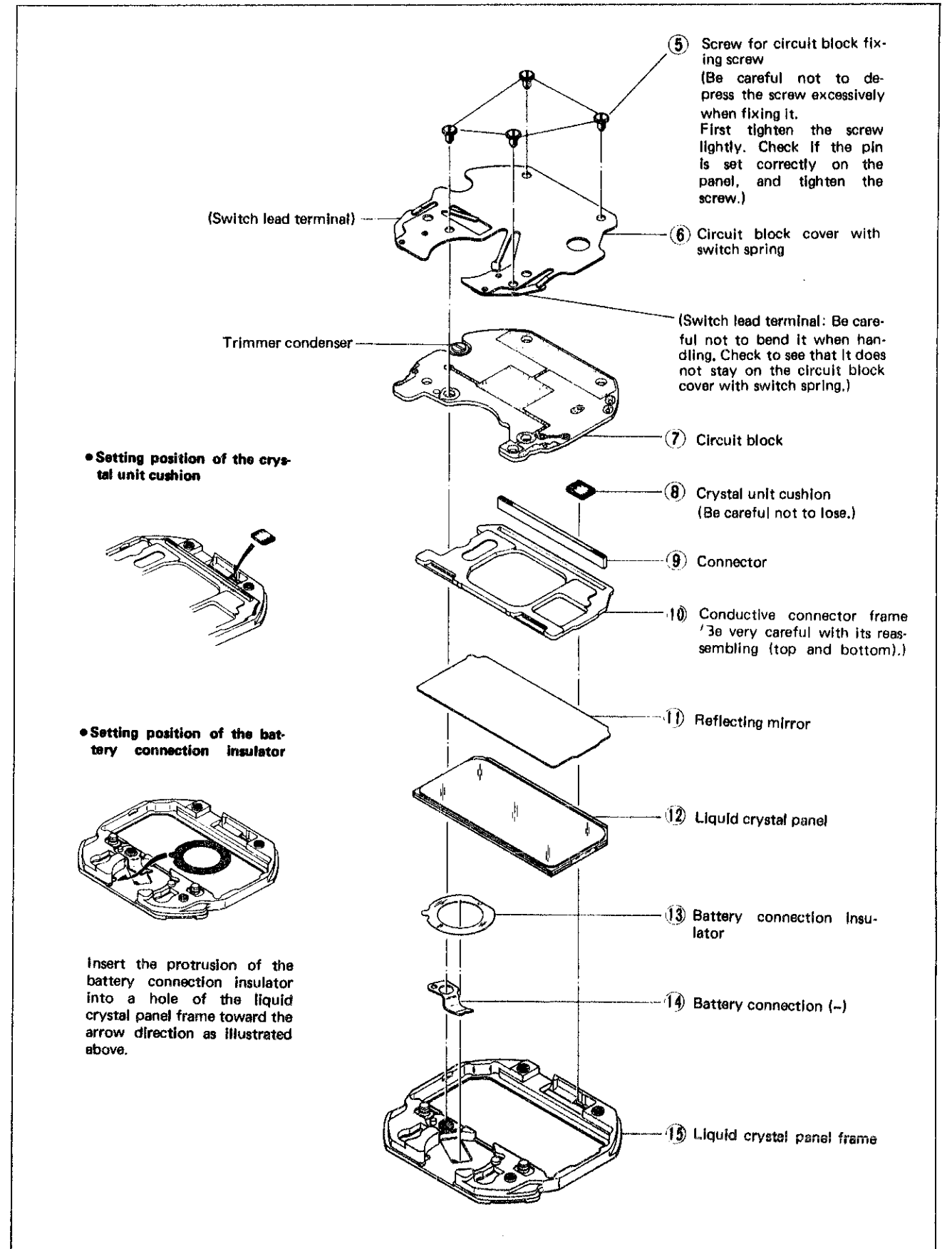
Reassembling procedures Figs. ⑮ → ①

● Be sure to use the Static Electricity Protector (S-830) for disassembling and reassembling.

### (1) Switch mechanism

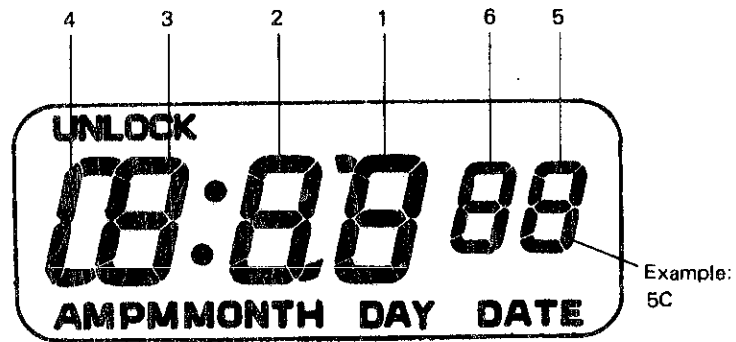
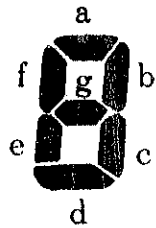


### (2) Circuit block side



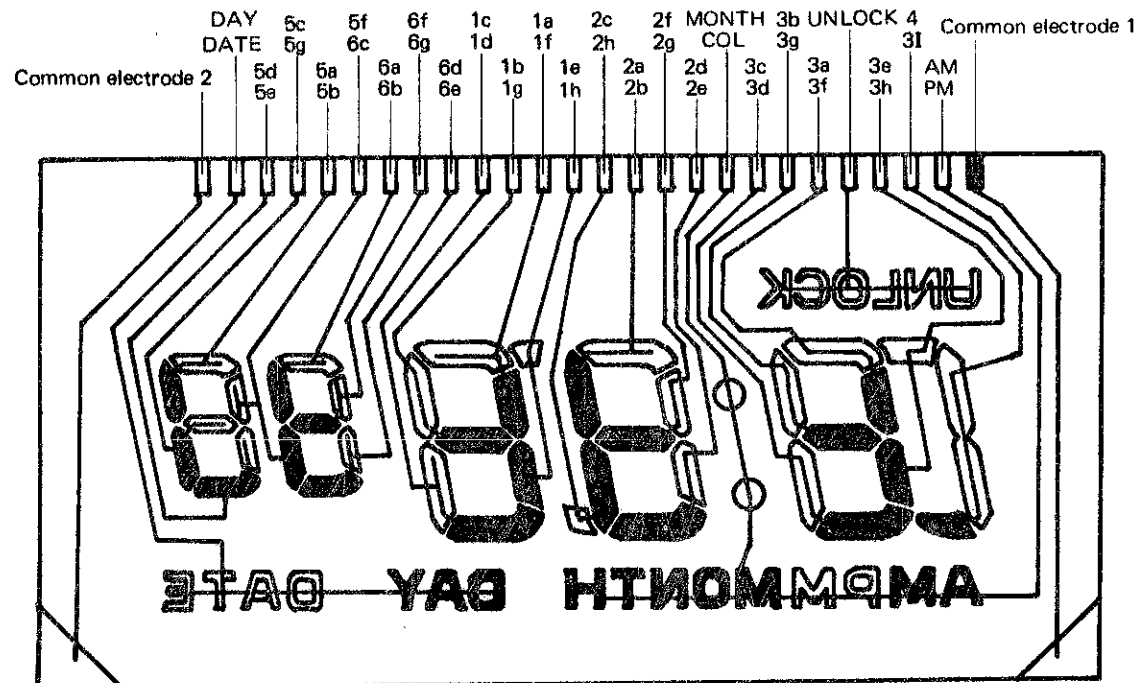
(3) Segment (Liquid Crystal Panel Electrode)

• Designation of segment



Common electrode 1 (Corresponding to segment)

Common electrode 2 (Corresponding to segment)



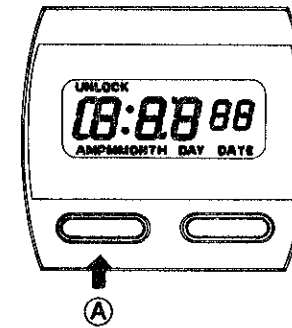
IV. CHECKING AND ADJUSTMENT

Procedures

CHECK BATTERY VOLTAGE

More than 1.5V: Normal  
Less than 1.5V: Defective  
Replace the battery with a new one.

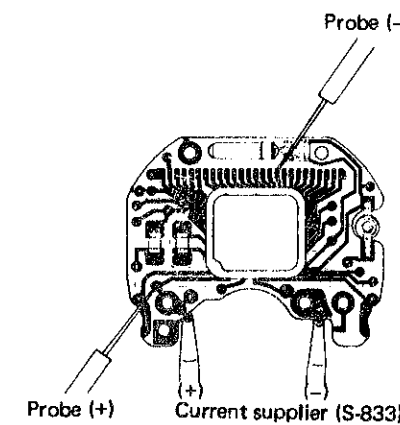
CHECK PATTERN SEGMENT CHECKING SYSTEM



- Depress button **A** for 6 seconds ("UNLOCK" mark starts flashing.), and depress button **A** once again for 3 to 4 seconds and all the segments are lit.
- Check if there is any defective segment.

CHECK CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR

CHECK LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK

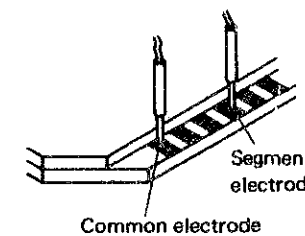


- Check to see if the electric signal is transmitted correctly from the circuit block.

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

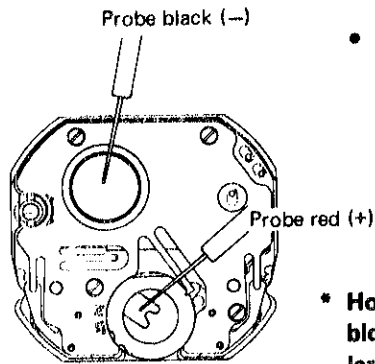
- Check to see if there are any broken wire, short circuit, etc. in the liquid crystal panel.

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



## Procedures

### CHECK CURRENT CONSUMPTION



- Volt-ohm-meter
- Probe red (+) . . . . . Battery connection (-)
- Probe black (-) . . . . . Battery surface (-)

#### Result:

Less than  $1.3\mu\text{A}$  : Normal  
Replace the battery with a new one.

More than  $1.3\mu\text{A}$  : Defective  
(\*Replace the liquid crystal panel or the circuit block.)

- \* How to find either of the liquid crystal panel and the circuit block should be replaced when the current consumption is large.

- Disassemble the liquid crystal panel from the module, and check the current consumption of the module assembled with the liquid crystal panel frame, battery connection (-), circuit block and circuit block cover with switch spring.

Less than  $1.0\mu\text{A}$  : Circuit block – Normal  
Replace the liquid crystal panel with a new one.

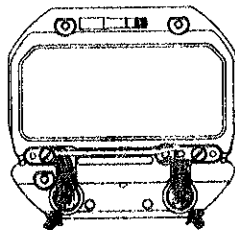
More than  $1.0\mu\text{A}$  : Circuit block – Defective  
Replace the circuit block with a new one.

### CHECK ACCURACY

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

### CHECK FUNCTIONING AND ADJUSTMENT

### CHECK CONDUCTIVITY OF SWITCH COMPONENTS



- Check to see if the switch spring (arrow-marked portion of the illustration on the left) touches the switch electrode of the circuit block when it is pushed with tweezers, and there is a clearance between the switch spring and the switch electrode when it is released.
- Check to see if there are any dust and lint.

#### Result:

Operates correctly : Normal  
Does not operate correctly : Defective

(If it is difficult to make the switch spring operate correctly, replace the switch spring with a new one.)

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