

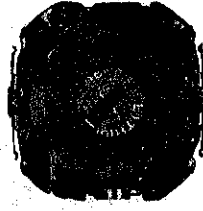
**SEIKO**

**DIGITAL QUARTZ**

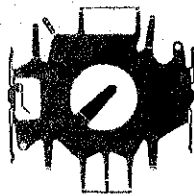
**Cal. M421A**

**PARTS  
CATALOGUE**

# Cal. M421A



4000 068



4225 065

EXOS  
☆4246 020

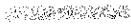
MDS  
☆4246 028



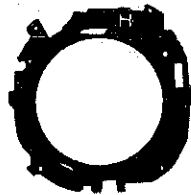
4257 012



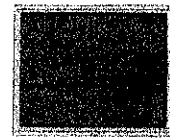
4270 058



4313 056



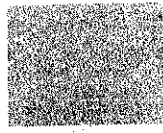
4395 013



☆4510 020



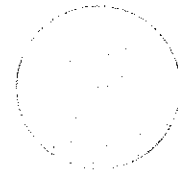
4512 002



4521 030



4530 017



4589 003



☆SEIKO CR2016

# Cal. M421A

## Characteristics

Casing diameter : 26.0 × 26.0 mm  
 Maximum height : 4.8 mm  
 Frequency of quartz crystal oscillator : 32,768 Hz (Hz=Hertz . . . . Cycles per second)  
 Display medium : Nematic Liquid crystal,  
 Regulation system : Trimmer condenser  
 Time and calendar display  
 Alarm display  
 Stopwatch display  
 Timer display  
 Dual time display

PART NO.	PART NAME	PART NO.	PART NAME
4000 068	Circuit block		
4225 065	Battery clamp		
☆4246 020	Buzzer lead terminal		
☆4246 028	Buzzer lead terminal		
4257 012	Anti-static electricity plate		
4270 058	Battery connection (-)		
4313 056	Connector		
4395 013	Battery guard		
☆4510 020	Liquid crystal panel (Silver)		
☆4510 024	Liquid crystal panel (Gold)		
4512 002	Liquid crystal panel frame		
4521 030	Reflecting mirror		
4530 017	Bulb		
4589 003	Piezoelectric element		
☆SEIKO CR2016 ☆Maxell CR2016 ☆Sanyo CR2016 ☆Matsushita BR2016	Lithium battery		

## Remarks :

### Buzzer lead terminal

☆4246 020 (Screw type caseback) }  
 ☆4246 028 (Other type caseback) } .....The type Buzzer lead terminal is determined on the design of cases.

### Liquid crystal panel

☆4510 020 } ..... Be sure that combination between the color of panel cover and liquid crystal panel should  
 ☆4510 024 } be matched according to the "SEIKO Quartz Casing Parts Catalogue".

### Battery

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

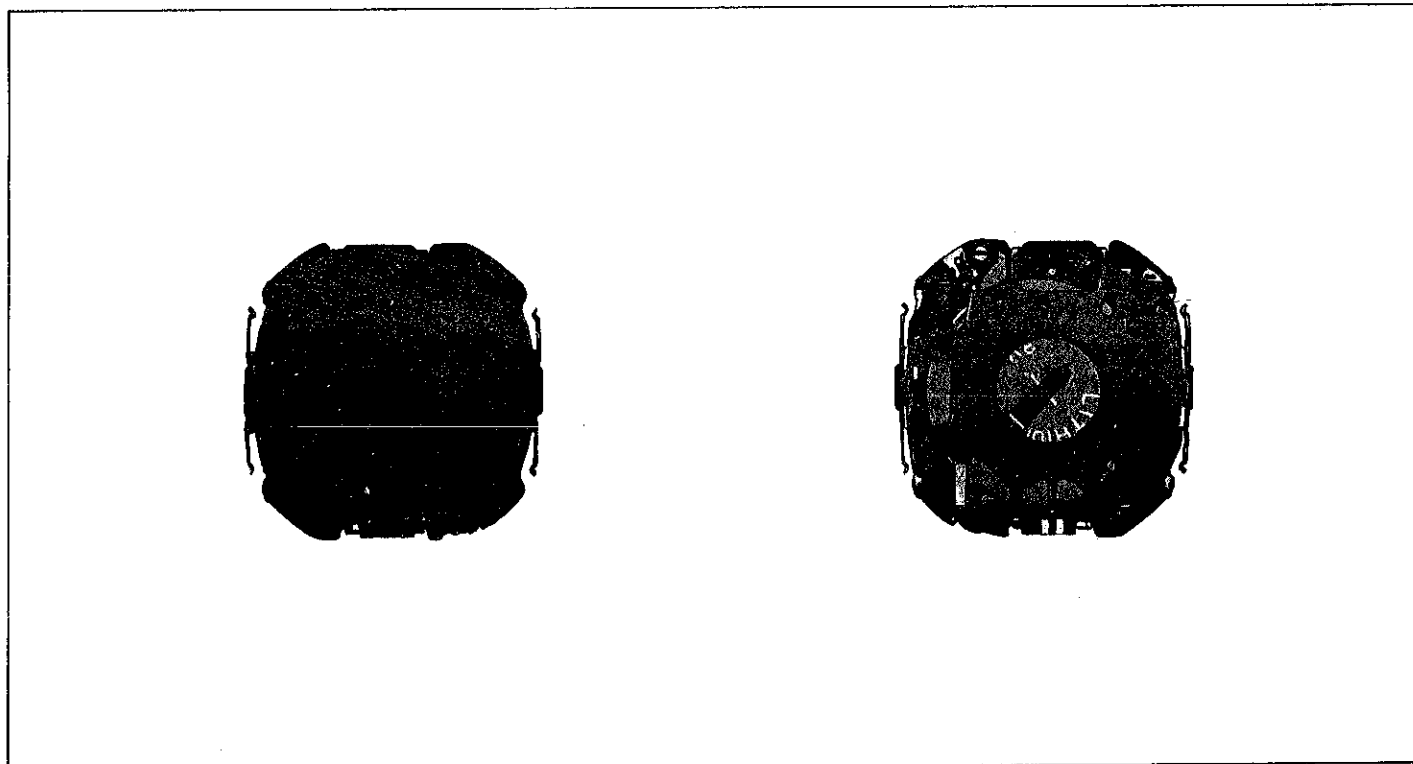
☆ ⇨ Please see remarks.

Part numbers in light letters are not shown in photos.

# TECHNICAL GUIDE

## SEIKO DIGITAL QUARTZ

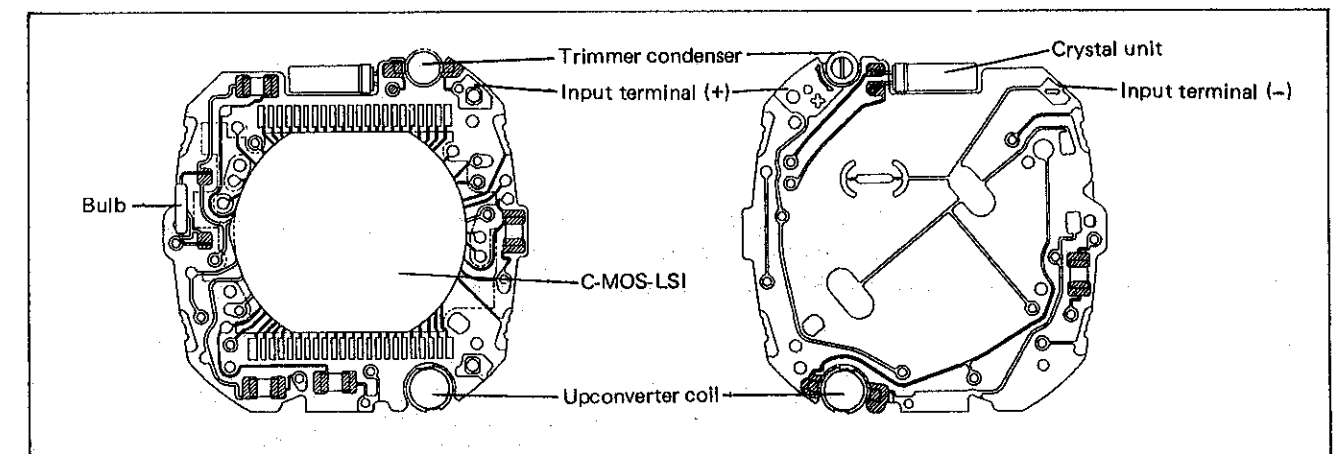
CAL. M421A



### I. SPECIFICATIONS

		Cal. No.	M421A
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- or 24-hour indication)</li> <li>• Alarm 1 display } (Rings for 20 seconds.)</li> <li>• Alarm 2 display }</li> <li>• Stopwatch display (up to 12 hours)</li> <li>• Timer display (up to 11 hours 59 minutes)</li> <li>• Dual time 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> <li>• Full-automatic calendar</li> </ul>	
Loss/gain		Monthly rate at normal temperature range: less than 15 seconds	
Module size	Outside diameter	φ29.3 mm 26.0 mm between 6 o'clock and 12 o'clock sides 26.0 mm between 3 o'clock and 9 o'clock sides	
	Height	4.8 mm	
Regulation system		Trimmer condenser	
Measuring gate by quartz tester		Any gate can be used.	
Battery		Lithium battery SEIKO (SEIZAIKEN) CR2016, Maxell CR2016, Sanyo CR2016, Matsushita BR2016 Voltage: 3.0V	

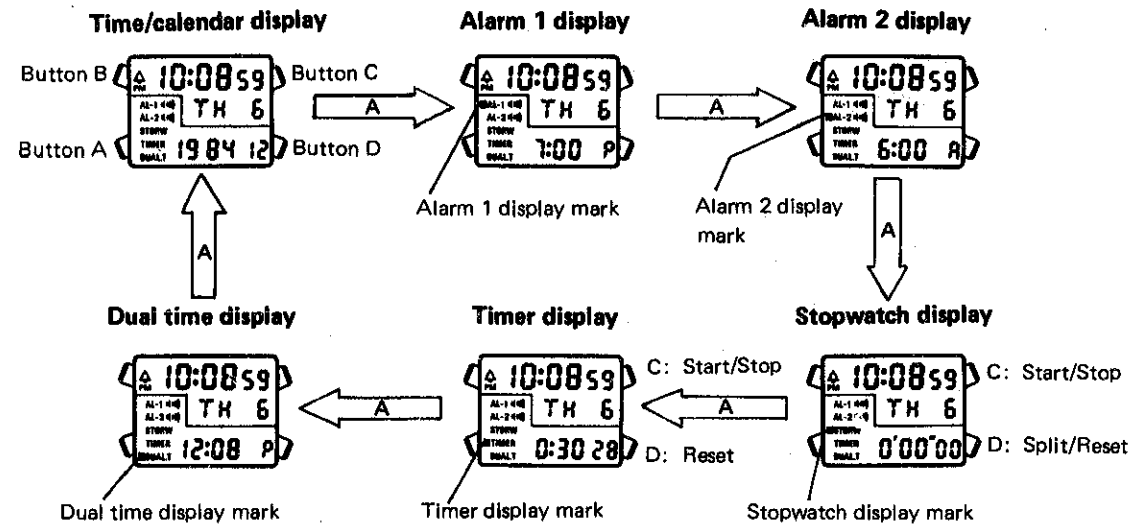
### II. STRUCTURE OF THE CIRCUIT BLOCK



### III. DISPLAY FUNCTION

#### • Display and button operation

The display changes in the following order with each depression of button A.



#### How to set the time/calendar, alarm time, timer and dual time

Keep button B pressed for one second in each display except the stopwatch to call the setting mode.

- Button C: Select
- Button D: Set

#### Notes:

- The day of the week can automatically be set by setting the year, month, and date.
- If the time/calendar display is changed over to the 24-hour indication ("24H" mark appears), the alarm time and dual time are also displayed in the 24-hour indication.
- Digits except seconds can be advanced quickly by keeping button D pressed in the time/calendar setting function.

#### How to engage and disengage the alarm

In the alarm display, pressing buttons C and D at the same time alternately engages and disengages the alarm.

#### How to engage and disengage the hourly time signal

In the time/calendar display, pressing buttons C and D at the same time alternately engages and disengages the hourly time signal.

#### All segments lighting up display

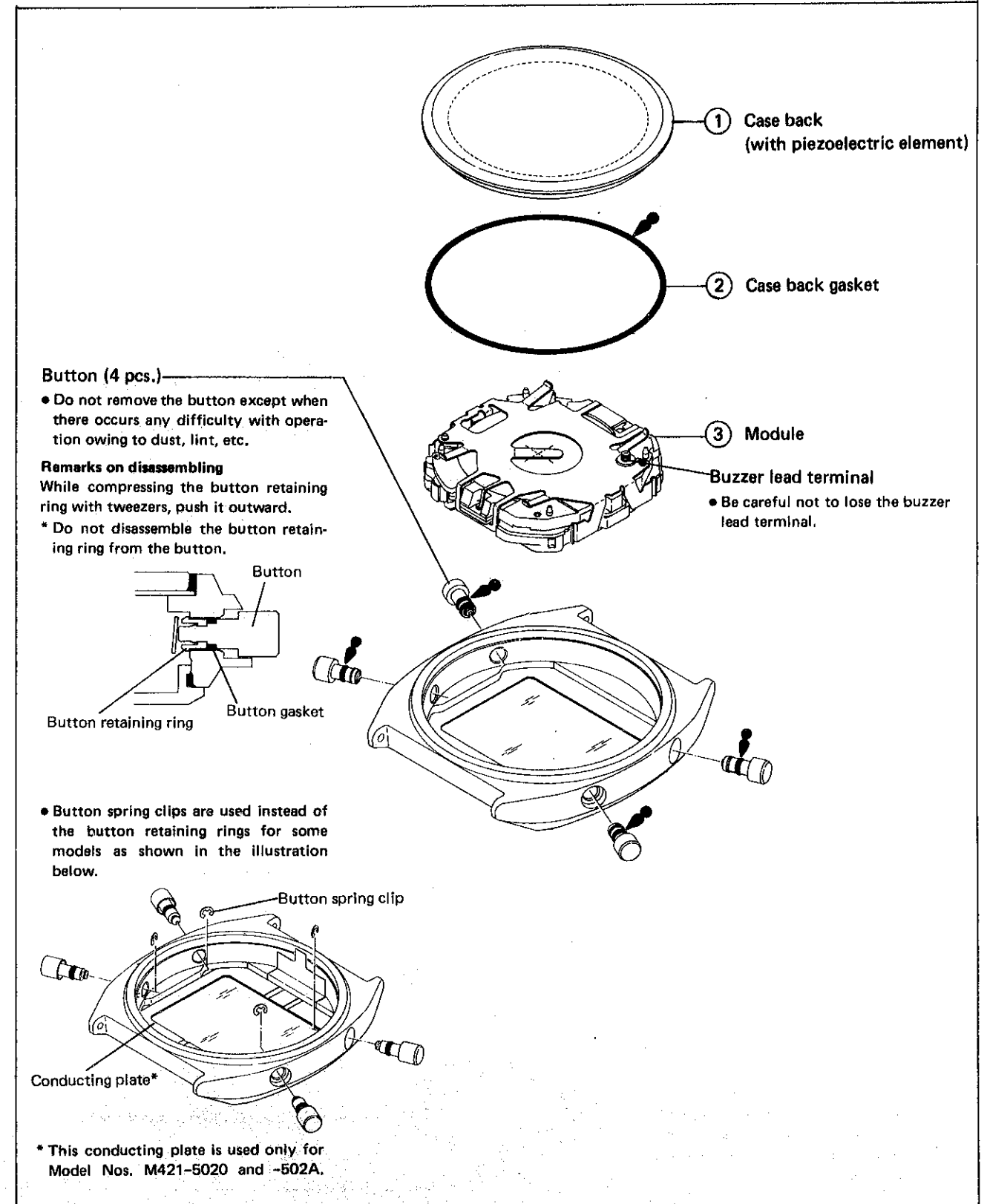
In the time/calendar display, press button B to activate the time/calendar setting function, and then press buttons C and D at the same time to light up all segments. Press any one of the four buttons to release all segments lighting up display.

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

Disassembling procedures Figs.: ① → ③

Reassembling procedures Figs.: ③ → ①

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



## V. DISASSEMBLING AND REASSEMBLING OF THE MODULE

Disassembling procedures Figs.: ① → ⑪

Reassembling procedures Figs.: ⑪ → ①

### ① Buzzer lead terminal




#### Removing

Turn the buzzer lead terminal counter-clockwise to release the straight portion of its end from the groove of the battery guard and remove it.

#### Installing

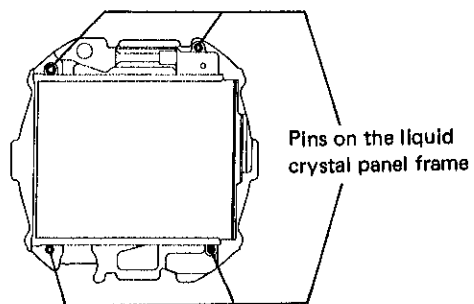
Push in the buzzer lead terminal securely so that its end is hooked to the groove of the battery guard.

\* The buzzer lead terminal is available in 2 types, depending on the construction of the case back.

Construction of the case back	Buzzer lead terminal	
	Case back side	Circuit block side
Screw type		
	Parts code 4246 020	
Other than the screw type		
	Parts code 4246 028	

### ④ Battery guard

The battery guard is fixed by the pins (4 pcs.) on the liquid crystal panel frame.



#### Removing

Pry up the battery guard lightly at the four hooking places by inserting the tip of a screwdriver into the clearance between the circuit block and the battery guard.

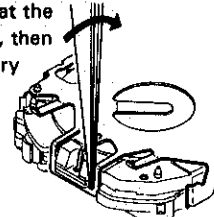
#### Installing

Press the battery guard uniformly so that there is no clearance between the circuit block and the liquid crystal panel frame and between the circuit block and the battery guard.

### ② Battery clamp

#### Removing

First, put the tips of tweezers into the clearance between the battery clamp and the battery guard at the 6 o'clock position, then release the battery clamp from the hook of the battery guard, and finally remove it.



#### Installing

When setting the battery clamp, hook it to the battery guard first at the 12 o'clock position and then at the 6 o'clock position.

### ③ Battery

Notch for buzzer lead terminal

### ⑤ Battery connection (-)

### ⑥ Circuit block

### ⑦ Anti-static electricity plate

#### Remarks on reassembling

Set the two notches of the anti-static electricity plate to the guide pins of the liquid crystal panel frame.

### ⑧ Connector (2 pcs.)

### ⑨ Reflecting mirror

### ⑩ Liquid crystal panel

### ⑪ Liquid crystal panel frame

## VI. CHECKING AND ADJUSTMENT

• The explanation here is only for the particular points of Cal. M421A.

Refer to the "TECHNICAL GUIDE, GENERAL INSTRUCTION" for SEIKO Digital Quartz for details.

### Procedure

#### CHECK BATTERY VOLTAGE

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

#### Result:

[SEIKO (SEIZAIKEN) CR2016, Maxell CR2016, or Sanyo 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

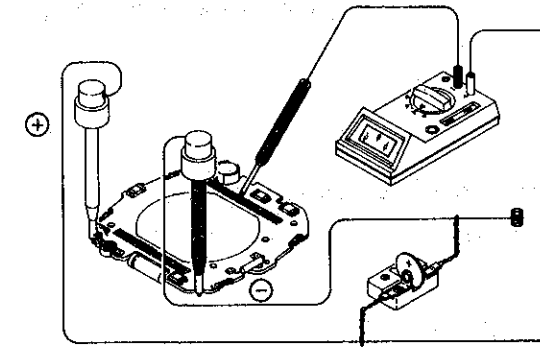
#### CHECK CIRCUIT BLOCK

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

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

Current supplier S-833

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



#### Result:

Normal : More than 1.2V

Defective : Less than 1.2V

Replace the circuit block with a new one.

(When the volt-ohm-meter is used for checking:)

#### Result:

Normal : More than 0.8V

Defective : Less than 0.8V

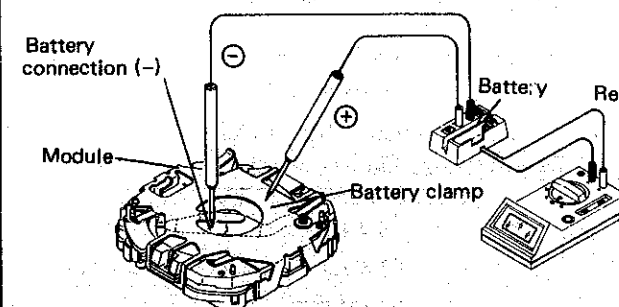
#### CHECK CURRENT CONSUMPTION

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

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

(1) Current consumption for the whole of the module

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



Probe red . . . . . Battery clamp  
Probe black . . . . . Battery connection (-)

#### Result:

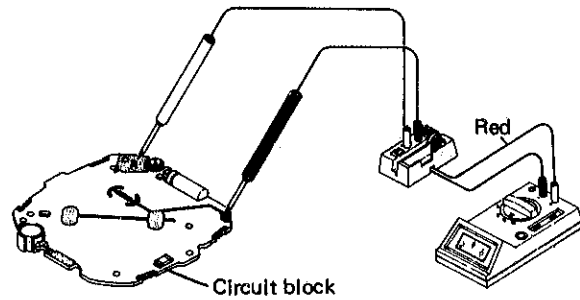
Normal : Less than 1.4 $\mu A$

Defective : More than 1.4 $\mu A$

**Procedure**

(2) How to find defects when the current consumption is more than  $1.4\mu A$ .

Check current consumption for the circuit block alone.



Probe red ..... Input terminal (+)  
 Probe black ..... Input terminal (-)

**Result:**

Normal : Less than  $0.8\mu A$   
 Defective : More than  $0.8\mu A$   
 Replace the circuit block with a new one.

**CHECK ALARM TEST SYSTEM**

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

**Result:**

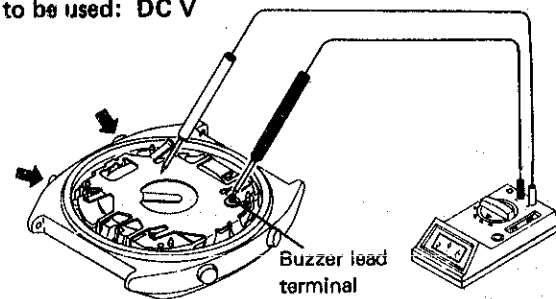
Normal : Alarm rings.  
 Defective : Display disappears.  
 Replace the battery with a new one.  
 Alarm does not ring.  
 Proceed to the procedure CHECK ALARM CONDITION.

**CHECK ALARM CONDITION**

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

Activate the alarm test system by keeping buttons C and D pushed at the same time in the time and calendar display or the alarm display.

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



**Result:**

Normal : The output voltage is displayed intermittently.  
 Proceed to (3).  
 Defective : The digits displayed remain "00.0V".  
 Proceed to (2).

(2) Check the upconverter coil.

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

**Result:**

Normal :  $130\Omega \sim 170\Omega$   
 Proceed to (3).  
 Defective : Less than  $130\Omega$   
 (Short circuit)  
 More than  $170\Omega$   
 (Broken wire)  
 Replace the circuit block with a new one.

**Procedure**

(3) Check the piezoelectric element.

Check the piezoelectric element to see if there is any crack, chip, peeling, or the like on it.

**CHECK ALL THE SEGMENTS LIT UP**

In the time and calendar display, push button B for one second to activate the time and calendar setting function and check to see if all the segments light up by pushing buttons C and D at the same time.

**Result:**

Normal : All the segments light up.  
 Defective : Some segments do not light up.  
 Replace the liquid crystal panel or the circuit block with a new one.

**CHECK BULB CONDITION**

In the time and calendar display or the alarm display, check to see if the bulb lights up by pressing button D.

**Result:**

Normal : Lights up.  
 Defective : Display is dim.  
 Replace the battery with a new one.  
 Does not light up.  
 Replace the bulb or the circuit block with a new one.