

# TECHNICAL GUIDE AND PARTS LIST

CAL. Y486A

## DIGITAL QUARTZ

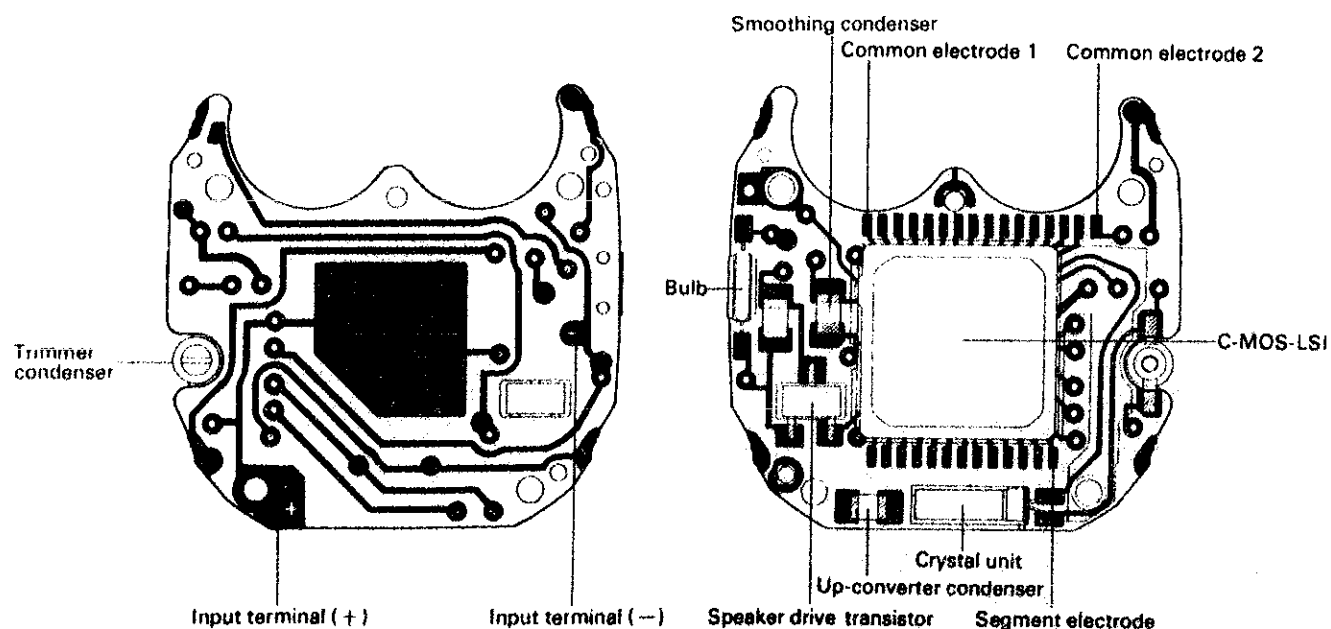
### CONTENTS

I. SPECIFICATIONS.....	1
II. CIRCUIT BLOCK SCHEMATIC .....	1
III. DISASSEMBLING AND REASSEMBLING .....	2
IV. CLEANING .....	3
V. CHECKING AND ADJUSTMENT .....	5
(1) Guide table for checking and adjustment.....	5
(2) Liquid crystal panel electrode.....	6
(3) Procedures for checking and adjustment .....	7
A. Battery voltage .....	7
B. Conductivity of liquid crystal panel, circuit block and connector.....	7
C. Circuit block and liquid crystal panel.....	7
D. Current consumption .....	8
E. Accuracy .....	9
F. Functioning.....	9
G. Conductivity of switch components.....	10
H. Speaker block.....	10
VI. PARTS LIST OF MODULE .....	11

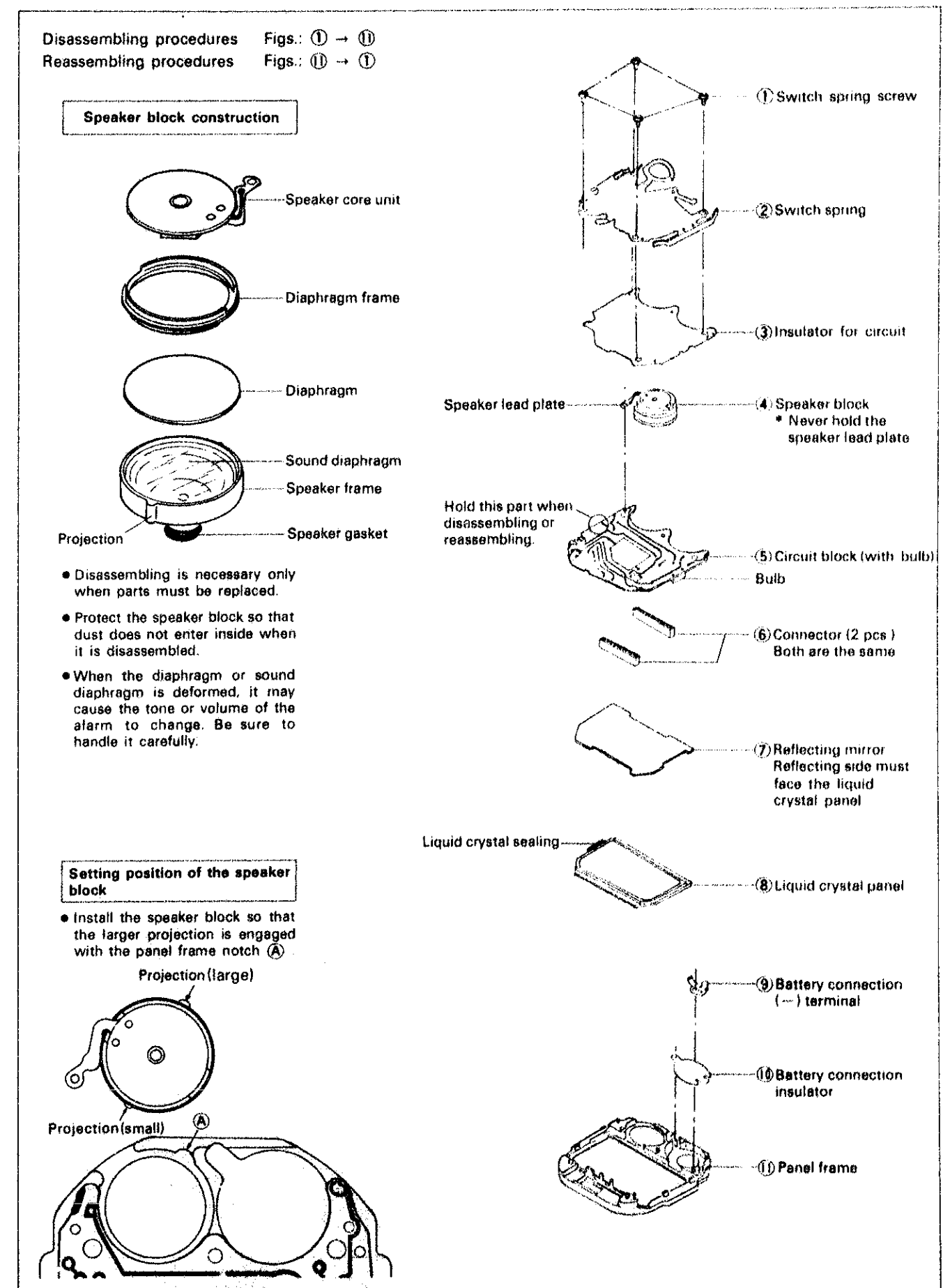
## I. SPECIFICATIONS

Item	Cal No.	Y486A
Display medium		Nematic Liquid Crystal, FEM (Field Effect Mode)
Liquid crystal panel drive system		Multiplex
Display system		Four-function changeover system with time, stopwatch, alarm setting and dual timer functions. * Time function: 12-hour digital system showing hour, minute, second and day of the week or month, date and day of the week. * Stopwatch function: Digital display system showing hour, minute, second, 1/10 second, 24 hours with lap time. * Alarm setting function: Alarm time can be set to operate at the desired time. * Dual time: 12-hour digital display system showing hour, minute and second.
Additional mechanism		Alarm repeat function Illuminating light
Crystal oscillator		32,768 Hz (Hz = Hertz ..... Cycles per second)
Loss/gain		Loss/gain at normal temperature range: Monthly rate: less than 15 seconds (Annual rate: less than 3 minutes)
Casing diameter		φ25.4 mm between 12 o'clock and 6 o'clock sides φ25.1 mm between 3 o'clock and 9 o'clock sides
Height		4.0 mm without battery
Operational temperature range		-10°C ~ +60°C (14°F ~ 140°F)
Regulation system		Trimmer condenser
Quartz tester measuring gate		Any gate is acceptable.
Battery power		Silver oxide battery: Toshiba WG-3 or Toshiba SR41W Battery life: Approximately 2 years Voltage: 1.55V
IC (Integrated Circuit)		C-MOS-LSI ..... 1 unit

## II. CIRCUIT BLOCK SCHEMATIC




## III. DISASSEMBLING AND REASSEMBLING



## IV. CLEANING

Clean the parts in accordance with the method shown in table below.

### 1. How to clean

Name of parts	Cleaning	Drying	Solution	Remarks
Connector 	Rinse or wash with a soft brush.	Warm air	Alcohol	<ul style="list-style-type: none"> <li>● Clean the contacting portion between the connector and liquid crystal panel, and circuit block.</li> <li>● Never use benzene, Diaflon S-3 or trichloroethylene as these will melt the parts.</li> <li>● Do not set the connector until it is completely dry.</li> </ul>
Plastic parts Panel frame Circuit block insulator Battery insulator	Rinse or wash with a soft brush.	Warm air	Alcohol, benzene or Diaflon S-3.	
Others (except the parts that must not be cleaned)	Rinse and wash with a cleaner or wash with a soft brush	Warm or hot air	Benzene, Diaflon S-3, Alcohol or trichloroethylene	

### 2. Parts that must not be cleaned



Circuit block



Liquid crystal panel



Reflecting mirror



Speaker block



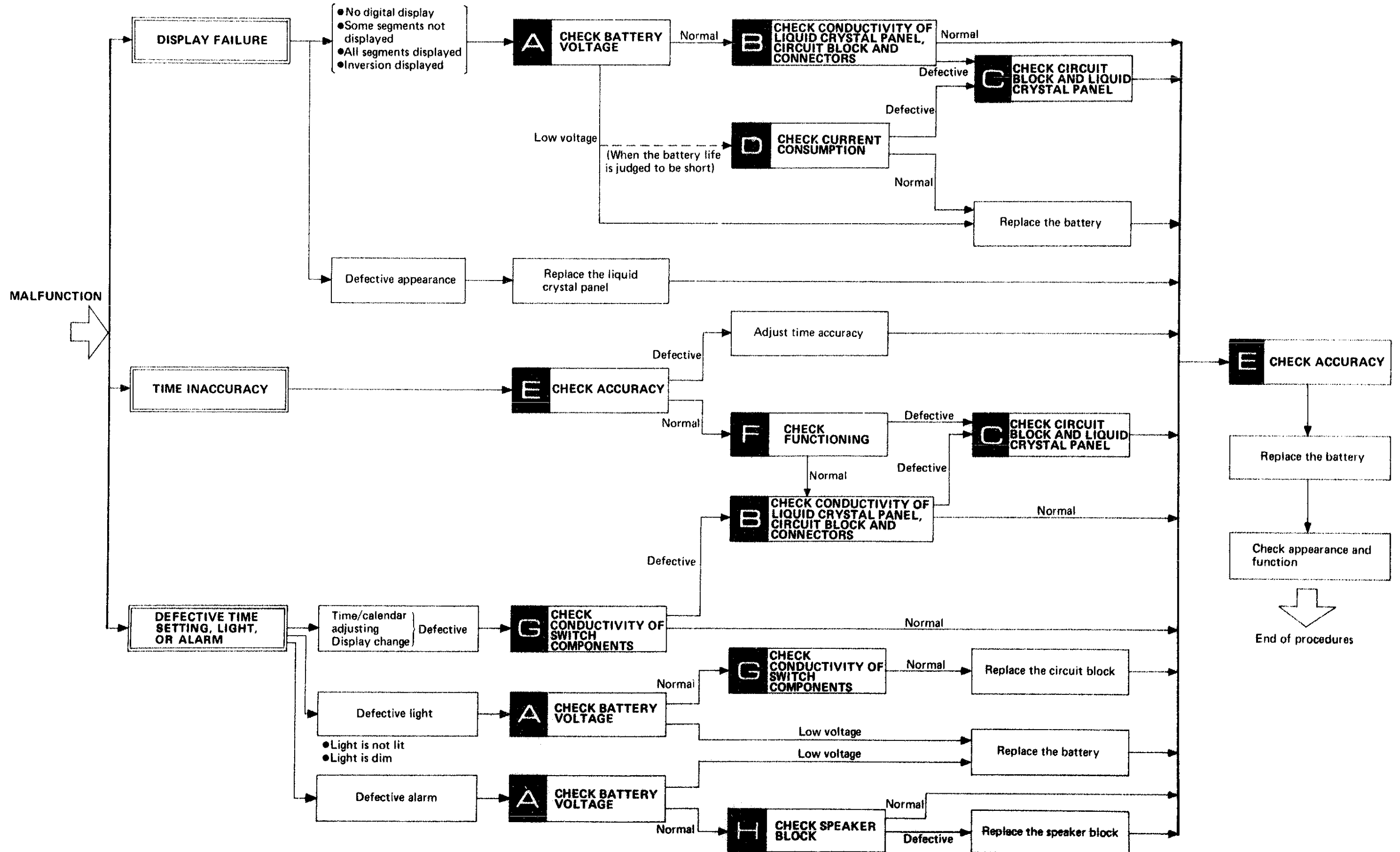
Battery

- Only the conductive portions should be wiped with a cloth moistened with benzene and dried with warm air.
- Remove dust and lint with a brush.
- Be careful not to scratch the front surface of the reflecting mirror.

# V. CHECKING AND ADJUSTMENT

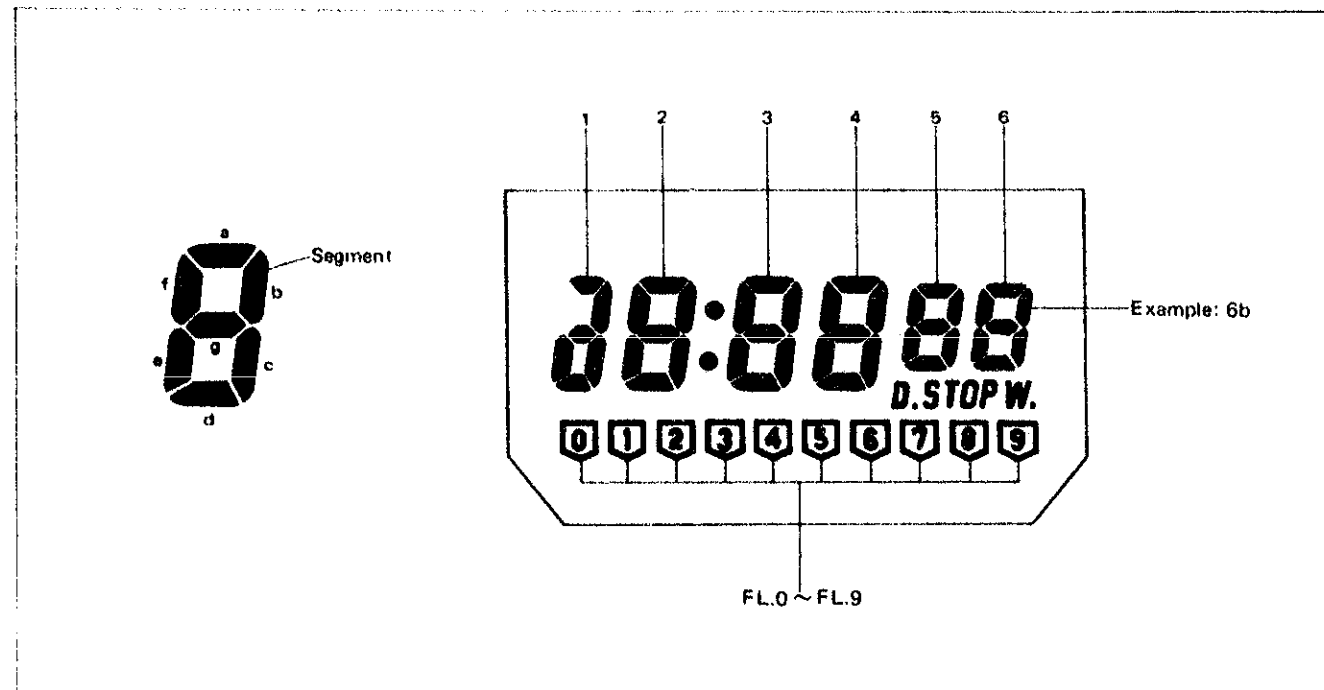
Be sure to use the static electricity protector when handling the module.



## (1) Guide table for checking and adjustment

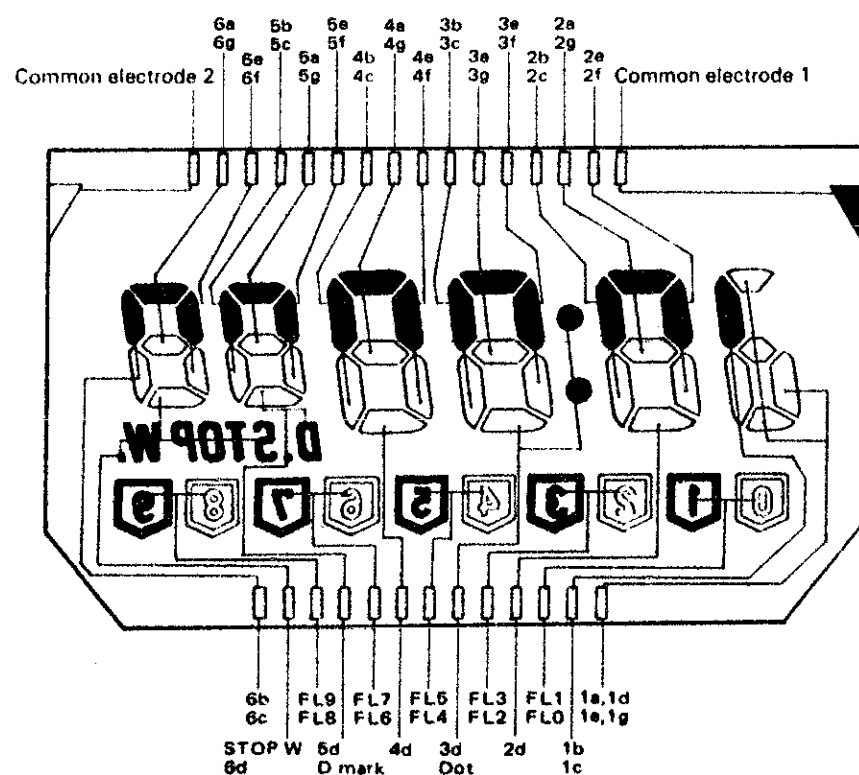


## (2) Liquid crystal panel electrode

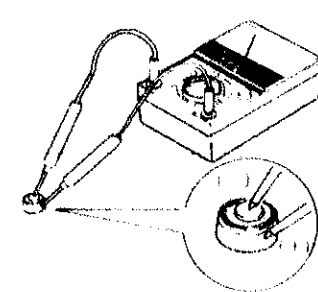
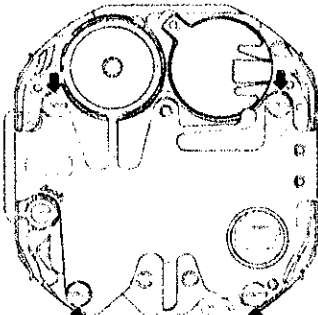
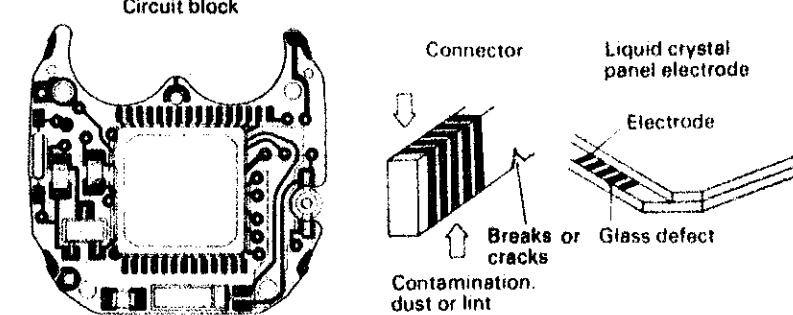
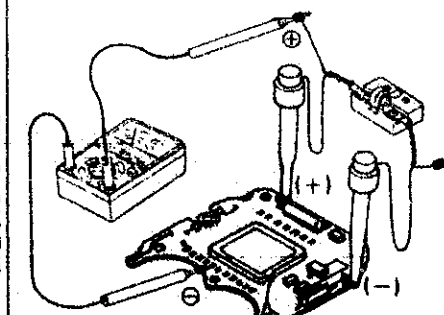
### ● Designation of segment



(Common electrode (1) is connected electrically with  segment.)  
 (Common electrode (2) is connected electrically with  segment.)

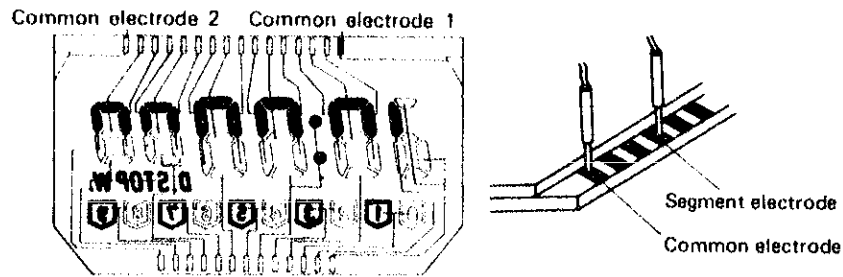


## (3) Procedures for checking and adjustment

	Procedures	Results and repair
<b>A</b> BATTERY VOLTAGE	<p>Check battery voltage.</p> <p>(1) Set up the volt-ohm-meter. Range to be used: DC 3V</p> <p>(2) Measuring Probe Red (+) ..... Battery surface (+) Probe Black (-) ..... Battery surface (-)</p> 	<p>More than 1.5V: Normal Less than 1.5V: Defective Replace the battery with a new one.</p>
<b>B</b> 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 and other contamination, breaks, scratches, or cracks on the conductive portions shown in the illustration below.</p> <p>Circuit block</p>  <p>Check the sides of 4 switch components.</p>	<p>No loose screws: Normal Proceed to <b>B</b> (2) Loose screws: Defective Retighten the screws.</p> <p>Uncontaminated: Normal Contaminated: Defective Wipe off any foreign matter</p> <p>No breaks, cracks or scratches: Normal Breaks, cracks or scratches: Defective Replace with a new one</p>
<b>C</b> CIRCUIT BLOCK AND LIQUID CRYSTAL PANEL	<p>(1) Check to see if the electric signal flows into the connector from the circuit block correctly.</p> <p>(1) Remove the circuit block from the module. (2) Supply the voltage power.</p> <p>1) Set up the volt-ohm-meter. Range to be used: DC 3V 2) Measuring Probe Red (+): ⊕ terminal of the electricity supplier Probe Black (-): Each portion of the output terminal of the C-MOS-LSI. (If some displays are defective, apply the probe to the corresponding output terminals of the C-MOS-LSI.) (Apply the probe to several portions.)</p> 	<p>More than 0.8V: Normal Less than 0.8V: Defective Replace the circuit block with a new one.</p>

## Procedures

- (2) Check for broken connecting leads, short circuit, etc. of the liquid crystal panel.
- 1) Turn the liquid crystal panel to the reverse side.
  - 2) Set up the volt-ohm-meter.  
Range to be used: OHMS Rx1  
(Any range will do if more than 3V is applied to the terminal of the volt-ohm-meter.)
  - 3) Apply the probes to the common electrode and the segment electrode of the liquid crystal panel.  
(Either red or black probe will do.)

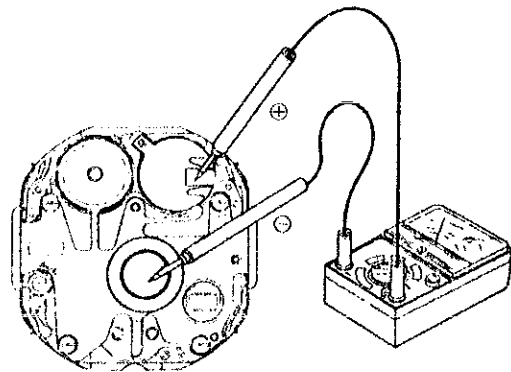


- The two common electrodes are provided on the liquid crystal panel. Each segment lights up by the potential difference between each segment and one of the two common electrodes.
- See the illustration on page 6 for the combination of each segment and the common electrodes (1) and (2).

## Results and repair

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

- (1) Check to see if the current consumption is normal.
- 1) Set up the volt-ohm-meter.  
Range to be used: DC 12  $\mu$ A
  - 2) Measuring  
Probe Red (+) ..... Battery connection  
Probe Black (-) ..... Battery surface (-)  
Measure the current consumption as shown in the illustration below.



## Note:

If the pointer of the Volt-ohm-meter swings over the maximum value and the current consumption cannot be measured, reset its range, e.g. at DC 30mA. Next when the pointer is stabilized, return the range to DC 12  $\mu$ A (or 0.03 mA) with the probes applied and read the value indicated.

- (2) Check the current consumption of the circuit block.  
Remove the liquid crystal panel and connectors.  
Fix the circuit block switch spring with screws and measure the current consumption.

Less than 2.7  $\mu$ A: Normal  
More than 2.7  $\mu$ A: Defective  
Replace the liquid crystal panel or circuit block with a new one.  
Proceed to (2).

Less than 2.3  $\mu$ A:  
Circuit block  $\rightarrow$  Normal  
Replace the liquid crystal panel with a new one.  
More than 2.3  $\mu$ A:  
Circuit block  $\rightarrow$  Defective  
Replace the circuit block with a new one.

## Procedures

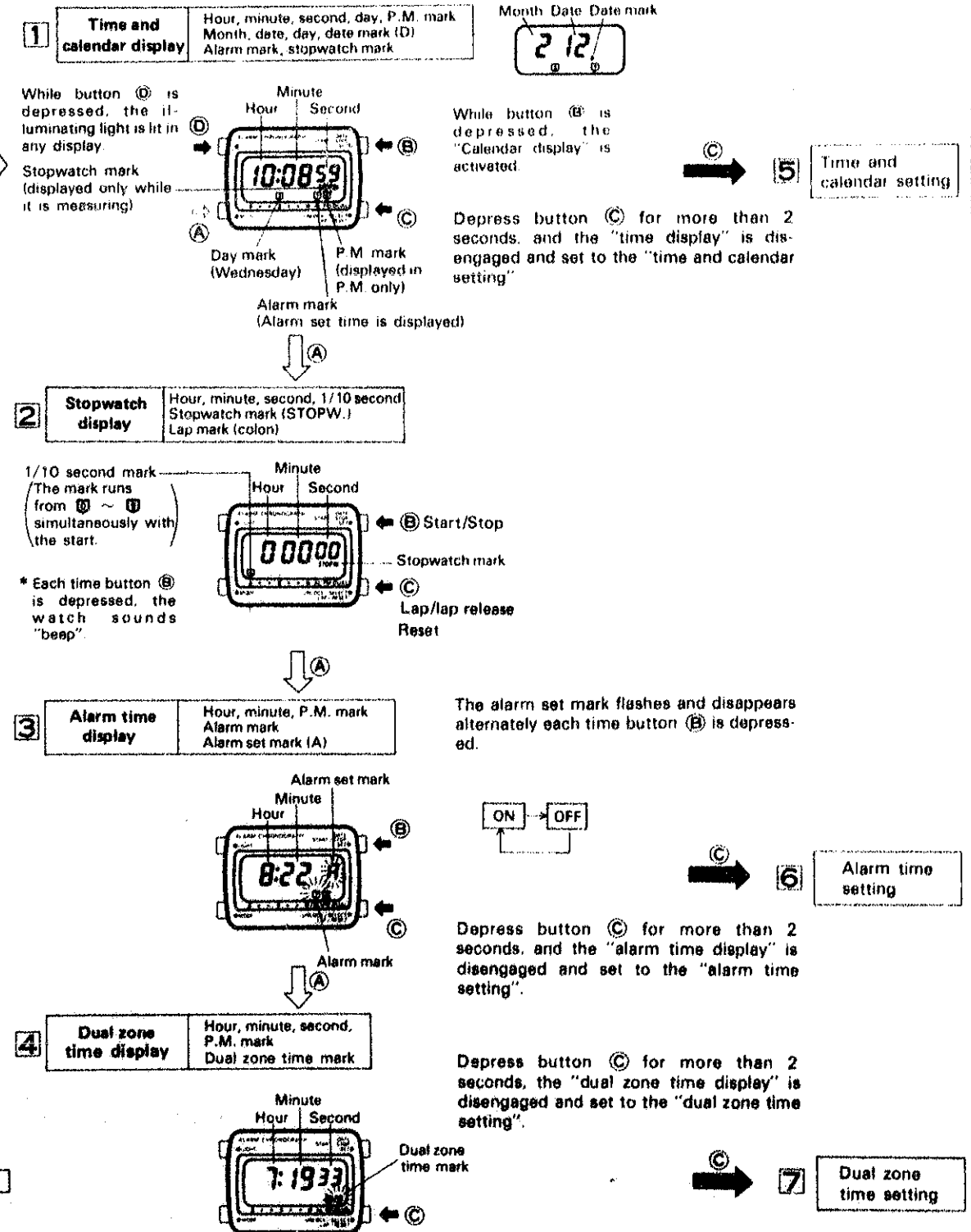
- Check gain or loss of time.  
Use the timing microphone (ultrasonic microphone) for checking accuracy. An electric-field detection microphone cannot be used.  
The accuracy should be checked when the stopwatch mode is in the reset position.

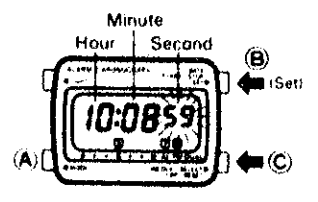
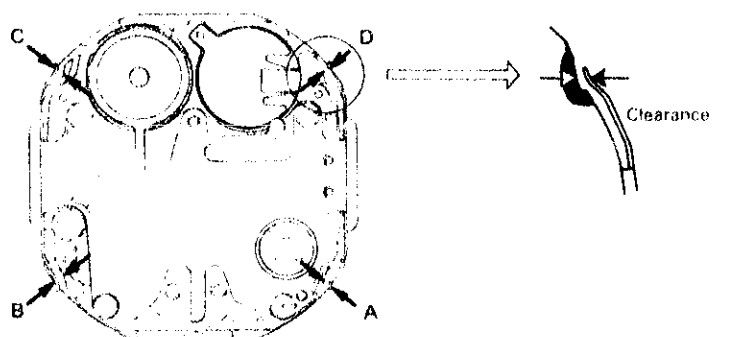
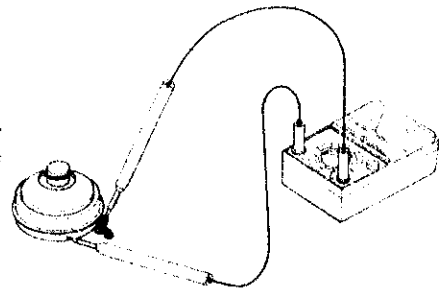
## Results and repair

Does not lose or gain: Normal  
Loses or gains: Defective  
Adjust the time accuracy by turning the trimmer condenser.

## DISPLAY AND BUTTON OPERATION

The display changes by each depression of button (A)



	Procedures	Results and repair
FUNCTIONING	<p><b>FUNCTIONING</b></p>  <ul style="list-style-type: none"> <li>When button (C) is depressed for more than 2 seconds in the time display, alarm display or dual time, the watch is set to the setting mode of each display and part of the display starts flashing.</li> <li>Confirm that the flashing part of the display changes when button (C) is depressed.</li> <li>The flashing digits advance one by one with each depression of button (B).</li> </ul>	<p>Functions correctly and can be adjusted: Normal</p> <p>Wear the watch on the wrist to check time accuracy.</p> <p>Does not function correctly or cannot be adjusted: Defective</p> <p>Replace the circuit block with a new one.</p>
CONDUCTIVITY OF SWITCH COMPONENTS	<p><b>CONDUCTIVITY OF SWITCH COMPONENTS</b></p> <p>Check to see if the switch spring functions correctly.</p>  <p>(1) Confirm that the four portions of the switch spring (A, B, C and D) come in contact with the circuit block lead terminals when the four portions are depressed with tweezers. Confirm that the clearance between the switch spring and circuit block lead terminal is twice as much as the width of the switch spring when released.</p> <p>(2) Check for dust, lint and other contamination of the connecting portions.</p>	<p>Functions correctly: Normal</p> <p>Proceed to <b>H</b></p> <p>Does not function correctly: Defective</p> <p>Correct the switch spring, or replace the switch spring with a new one.</p> <p>Uncontaminated: Normal</p> <p>Contaminated: Defective</p> <p>Wipe off any foreign matter.</p>
SPEAKER BLOCK	<p><b>SPEAKER BLOCK</b></p> <p>Measure the coil resistance of the speaker block to check for a broken wire or short circuit.</p> <ol style="list-style-type: none"> <li>Set up the Volt-ohm-meter. Range to be used: OHMS Rx1</li> <li>Measuring Attach the probes to the speaker frame and the lead terminal of the speaker block.</li> </ol> 	<p>120Ω ~ 140Ω: Normal</p> <p>Less than 120Ω: Short circuit More than 140Ω: } Defective Broken wire</p> <p>Replace the speaker block with a new one.</p>

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

## VI. PARTS LIST OF MODULE

Cal. Y486A			
PART NO.	PART NAME	PART NO.	PART NAME
4001 238	Circuit block	MAXELL SR41SW	Battery
4216 234	Insulator for circuit		
4219 232	Battery connection insulator		
* 4245 235	Switch spring		
4270 233	Battery connection (-)		
4313 235	Connector		
4398 094	Liquid crystal panel frame		
4398 097	Speaker frame		
☆ 4398 253	Speaker frame (100m)		
4510 331	Liquid crystal panel		
4510 332	Liquid crystal panel (Gold)		
4521 232	Reflecting mirror		
4580 240	Speaker block		
☆ 4580 245	Speaker block (100m)		
4991 237	Speaker gasket		
☆ 4991 239	Speaker gasket (100m)		
012 470	Switch spring screw		
017 230	Tube for switch spring screw		
SEIZAIKEN TR41SW	Silver oxide battery		
<b>Remarks:</b>			
☆ 4398 253	Speaker frame	} Used for a "100m water-resistant" watch	
☆ 4580 245	Speaker block		
☆ 4991 239	Speaker gasket		
Battery			
SEIZAIKEN TR41SW	} An additional battery for this calibre might be added as a substitute in the future.		
MAXELL SR41SW			

☆ ○ Please see remarks.

\* Switch spring for Pulsar Watches

4245236 (Pulsar marking)