

# TECHNICAL GUIDE

CAL. Y702 A

# DIGITAL QUARTZ

Calibre Y702A



Module

## I. SPECIFICATIONS

Item	Cal. No. Y702A
Display medium	Nematic Liquid Crystal, FEM (Field Effect Mode)
Display system	Four function changeover system with time, stopwatch, counter and time/calendar setting functions. <ul style="list-style-type: none"> <li>Time function: Digital display system showing hour, minute, second and day of the week. In the time function, calendar and elapsing time in the stopwatch function displayed by depressing a button.</li> <li>Calendar: Digital display system showing month, date and day of the week.</li> <li>Stopwatch function: 12-hour digital display system showing hour, minute, second and 1/100 second (The 1/100 second measurement is possible up to 20 minutes.)</li> <li>Counter function: <ul style="list-style-type: none"> <li>Single counter: Counting up to 9999</li> <li>Tens counter: Counting up to 99 in two ways</li> </ul> </li> <li>Time/calendar setting function: Time and calendar can be set to operate at a desired second, minute, hour (with "A" for A.M.)/"P" (for P.M.) indication), date, month and day of the week.</li> </ul>
Additional mechanism	<ul style="list-style-type: none"> <li>Illuminating light</li> <li>Pattern segment clocking system</li> </ul>
Crystal oscillator	32,768 Hz (Hz = Hertz, Cycle per second)
Loss/gain	Loss/gain at normal temperature range Monthly rate: less than 15 seconds (Annual rate: less than 3 minutes)
Case diameter	φ30.1 mm
Height	6.5 mm (without battery)
Operational temperature range	-10°C ~ +60°C (14°F ~ 140°F)
Regulation system	Trimmer condenser
Battery power	Silver oxide battery: U.C.C. 388, Maxell SR1130W or Toshiba WG-10 Battery life is approximately 2 years. Voltage: 1.55 V
IC (Integrated Circuit)	C.MOS LSI 1 unit

## II. DISASSEMBLING, REASSEMBLING AND LUBRICATING

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

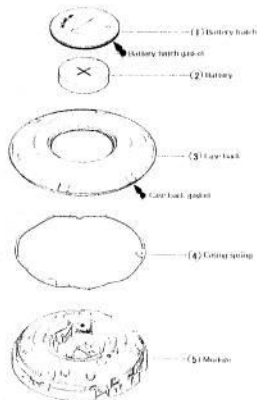
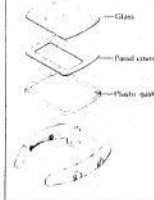
Disassembling procedures: Figs. ① ~ ④

Reassembling procedures: Figs. ④ ~ ①

Lubricating: Silicone grease (500,000 c.s.)  
Normal quantity →  
Ex) Y702.5000 [A]

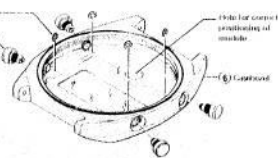
#### Glass portion

It is not necessary to disassemble the glass except when it is replaced. (See page 4 for handling.)



① Hook up for time adjusting buttons (Time adjusting buttons)

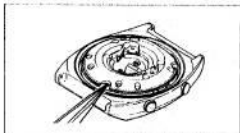
It is not necessary to disassemble the case adjusting buttons and hook-ups for time adjusting buttons (4 assembled) except when they are required to be replaced.



#### Remarks for disassembling

##### 3 Module

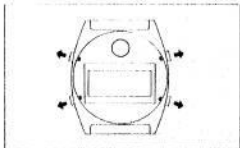
- As the liquid crystal panel frame is fixed fast to the case bezel, pry it up with tweezers and remove the module.



#### Remarks for assembling

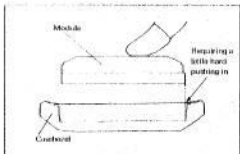
##### 6 Case bezel

- Before assembling the module, pull out all buttons so that the switch springs do not prevent the module from being reassembled.  
(Push the buttons from inside with the tips of tweezers.)



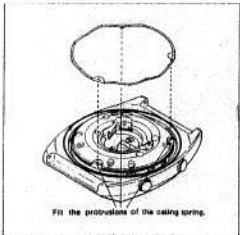
##### 3 Module

- As the liquid crystal panel frame is fixed fast to the case bezel, push in the module with fingers.
- Push it in so that it does not catch the buttons.



##### 4 Casing spring

- Set the casing spring as shown in the illustration on the right with the upper side and the lower side placed correctly.  
(There are three protrusions on the casing spring; two of which are larger and one is smaller. Be sure to fit each of them correctly to the corresponding notches of the module.)



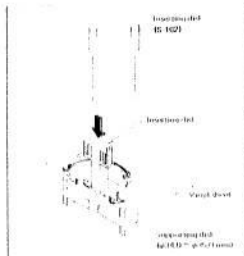
Fit the protrusions of the casing spring.

#### How to replace the glass

(Do not disassemble the glass except when the replacement of the glass and the panel cover is necessary.)

##### • How to disassemble the glass

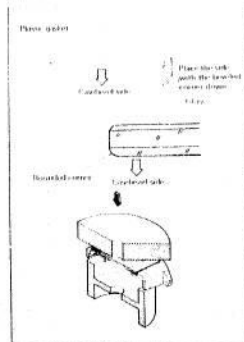
- Remove the glass with the tightening tool S-220, S-220.  
Inserting disk: S-162  
Supporting disk:  $\phi 34.0 \sim \phi 35.0$  mm
- Place a vinyl sheet between the glass and the inserting disk as shown in the illustration on the right.
- Push only the glass for disassembling with the inserting disk (S-162). Do not push the panel cover.



##### • How to reassemble the glass

- Set the plastic gasket.
  - Be sure to replace the plastic gasket with a new one.
  - Be careful not to mistake the upper side for the lower side.
- Reassemble the panel cover.
  - Be sure to set the backside of the panel cover fast to the case bezel.
  - Be sure that the space between the case bezel and the edge of the panel cover is uniform in width.
- Place the glass.
  - Be careful not to mistake the upper side for the lower side. Place the round side down.
  - Push in the glass (by using S-220).  
Inserting disk: Plastic supporting disk (S-173)  
Supporting disk:  $\phi 28.0$  or  $\phi 28.5$  mm

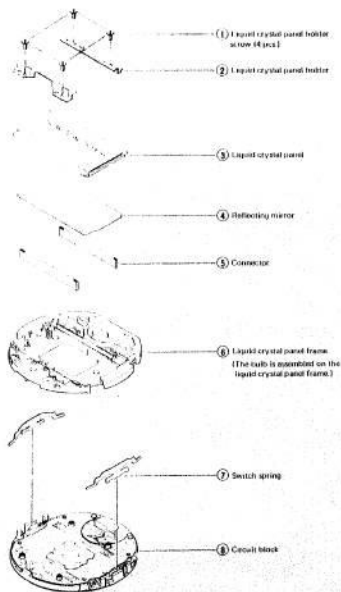
Some models are reassembled in the order of (1) panel cover, (2) plastic gasket. See the Watch Casing Guide for details.



## 2. Disassembling and reassembling of the module

Disassembling procedures: Figs. (1) ~ (6)

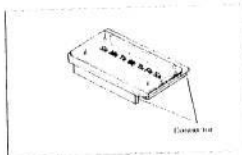
Reassembling procedures: Figs. (6) ~ (1)



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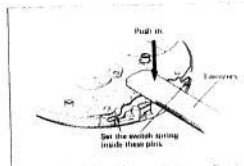
### Remarks for disassembling

- ① Reflecting mirror
- Be careful not to scratch or contaminate the reflecting mirror.
- ③ Connector
- The connectors may be disassembled together with the liquid crystal panel.
  - Be careful not to scratch the connector with tweezers.
  - There is no difference between the connectors in the top and bottom.
- ⑧ Circuit block
- Be careful not to touch the electronic parts except when it is necessary.




### Remarks for assembling

- ⑦ Switch spring
- Set the switch spring in position vertically from above.
  - Push it in by the flat part of the end of the tweezers.



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### 3. Cleaning

Name of parts	Cleaning	Drying	Solution	Remarks
Connector 	Rinse	Hot air	Alcohol	<ul style="list-style-type: none"> <li>• Be sure to reassemble after drying thoroughly.</li> <li>• Do not use benzine or trichloroethylene as they expand the connector.</li> </ul>
Other parts Switch spring, liquid crystal panel holder and liquid crystal panel holder screw	Clean or rinse with a cleaner or a brush.	Cool or hot air	Trichloroethylene, benzine or alcohol	

#### • PARTS THAT MUST NOT BE CLEANED



Circuit block



Liquid crystal panel



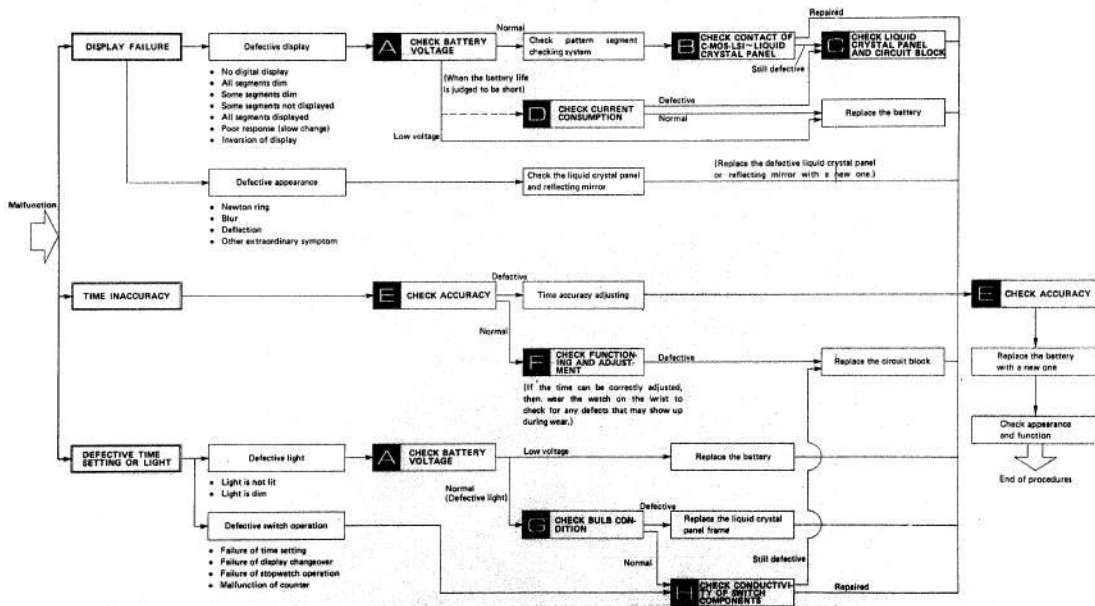
Reflecting mirror



Liquid crystal panel frame (with bulb)

- Wipe dust and lint off with a soft brush.
- Be sure to clean only stains on the electrodes of the liquid crystal panel and the circuit block with a cloth moistened with benzine or alcohol.

## 1. Guide table for checking and adjustment



## 2. Relationship between the segment (Liquid Crystal Panel Electrode) and the C-MOS LSI output terminal

A complete knowledge of how the segment (Liquid Crystal Panel Electrode) works with the C-MOS LSI output terminal will provide the proper procedures for checking and adjustment.

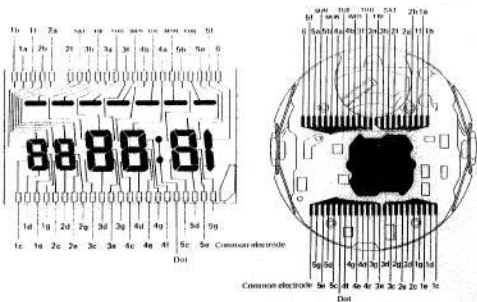
### • Designation of segment



### • Relationship between the segment and the C-MOS LSI output terminal

The liquid crystal panel electrode is connected electrically with each segment which forms a digital figure as shown in the illustration of the panel pattern below.

(The panel pattern can be seen if the panel is slightly tilted and looked at in an angular position.) Also, the liquid crystal panel electrode is connected electrically with the C-MOS LSI output terminal by the connector.



Note: Poor conductivity of the common electrode causes the lighting of all segments or inversion of the display.

## 3. Procedures for checking and adjustment

	Procedures	Result and repair
CHECK BATTERY VOLTAGE	<p>Check battery voltage.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>When there is battery electrolyte leakage, refer to "HOW TO CHECK BATTERY ELECTROLYTE LEAKAGE AND REPAIR" below for repair.</p> </div>	<p>More than 1.5V ... Normal Less than 1.5V ... Defective</p>
	<p>(1) Remove the module from the case. (2) Disassemble the module. (3) Wipe off battery electrolyte on the circuit block.</p> <p>1. Wipe off battery electrolyte with a cloth moistened with distilled water. If distilled water is not available, use tap water.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Note:</p> <ul style="list-style-type: none"> <li>Do not expose the trimmer condenser to water or alcohol, and if it is exposed, there may be a change in the condenser capacity and eventually in the time accuracy.</li> <li>Do not use a cloth which gives off lint, such as gauze, flannel, etc.</li> </ul> </div> <p>When the circuit block is cleaned, be sure to clean the connecting portions.</p> <div style="text-align: center;"> </div> <p>2. Rinse with alcohol. (If the cleaned portions remain wet with water, they will corrode with rust.) 3. Dry with warm air by using a dryer.</p> <p>(4) Clean the other parts (switch spring, etc.). 1. Wipe off battery electrolyte on each part with a soft brush moistened with distilled water. If distilled water is not available, use tap water. 2. Rinse with alcohol. 3. Dry with warm air by using a dryer.</p> <p>(5) Reassemble the module. Replace the battery with a new one.</p> <p>(6) Check to see if the time and calendar function, the stopwatch function, the calendar function and the current consumption are normal.</p>	
HOW TO CHECK BATTERY ELECTROLYTE LEAKAGE AND REPAIR		

## Procedures

If some segments are dead or dim, set the mode for the time and calendar setting functions. Then depress buttons (b) and (c) together to find defective segments.

(If there is no defective segment, all segments light up.)



After removing the liquid crystal panel, check for poor conductivity of the liquid crystal panel, connector and C-MOS LSI output terminal whose segments are found to be defective in "CHECK PATTERN SEGMENT CHECKING SYSTEM." (Refer to the "Relationship between the segment and the C-MOS LSI output terminal" on page 8.) Use a microscope for checking.

(1) Check for dust, lint and other contamination on the liquid crystal panel electrodes.

Liquid crystal panel electrode



(2) Check for any contamination, scratch, crack and break of the connector.



Be sure to check the connecting portions of the liquid crystal panel and the circuit block carefully.

(3) Check for dust, lint and other contamination on the output terminal of the circuit block.



Output terminal of the circuit block

## Result and repair

Proceed to **21**

Uncontaminated: Normal

Proceed to **21** (2)

Contaminated: Defective

Wipe off any foreign matter.

No contamination, scratch

crack or break: Normal

Proceed to **21** (2)

Contaminated: Defective

Clean off.

Scratched, cracked or broken:

Defective

Replace the connector

with a new one.

Uncontaminated: Normal

Proceed to **21**

Contaminated: Defective

Wipe off any foreign matter.

## Procedures

Check to see if the liquid crystal panel and the circuit block function correctly.

(Refer to the "Relationship between the segment and the C-MOS LSI output terminal" on page 8.)

(1) Check liquid crystal panel.

- Set up the volt-ohm meter.
- Range to be used: OHMS  $R \times 1 \sim R \times 1K$

**Note:** Any range will do if more than 3V is applied to the terminal of the volt-ohm meter. When the volt-ohm meter other than the volt-ohm meter S-831 is used, all segments may not be lit. If any segment does not light, change the range to the one ( $R \times 10K$ ) which is higher in resistance than  $R \times 1K$ .

- Remove the liquid crystal panel from the module and turn it upside down.
- Measuring (Check to see if the corresponding segment lights up.)



Use check of defective segments

**Note:** Either red or black probe will do.

Common electrode (Either red or black probe must be applied to the common electrode.)

(2) Check the circuit block output voltage.

- Set up the Volt-ohm meter.
- Range to be used: DC 3 V

(1) Set up the Volt-ohm meter.

Range to be used: DC 3 V

(2) Attach the electricity

supplier (S-831) to the circuit block.

Spring (+): Plus terminal of battery connection

Spring (-): Battery connection

(3) Measuring

Probe Red (+):

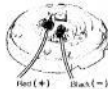
Pin for the liquid crystal panel holder screw

of the circuit block

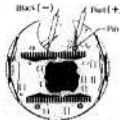
(Shown in the right illustration.)

Probe Black (-):

Each portion of the output terminal of the C-MOS LSI. (If some displays are defective, apply to the corresponding output terminals of the C-MOS LSI.)



Red (+) Black (-)



Black (-) Red (+)

## Result and repair

Lights up: Normal

Proceed to **21** (2)

Does not light up: Defective

Replace the liquid crystal panel with a new one.

Does not light up: Defective

Replace the liquid crystal panel with a new one.

More than 0.8V: Normal

(All the terminals must be more than this range of volt age.)

Return to **21**

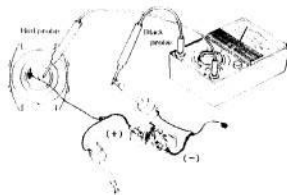
Less than 0.8V: Defective

Replace the circuit block with a new one and check to see if it functions correctly.

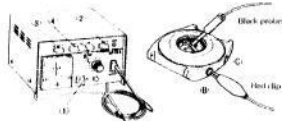
## Procedures

Check to see if the current consumption is normal.  
(Can be checked no matter which function the watch may be performing.)

- Set up the volt ohm meter.  
Range to be used: DC 12 $\mu$ A (DC 0.03 mA)<sup>\*</sup>  
Use the electricity supplier (S 833) and connect as shown in the illustration below.



- Micro Test MT 10 II<sup>\*</sup>
- 1 Power switch ... ON
  - 2 Polarity changer button:  $\pm$
  - 3 Current consumption/Voltage indication button:  $\mu$ A
  - 4 Voltage selection button: 1.55V  
Probe Black (+): Battery connection  
Clip Red (-): Button  
(except the light button)



Apply the red clip (+) to the button  
(-) or button (+) for measuring.

Be careful not to depress the buttons while measuring.

## Result and repair

<sup>\*</sup>Note:  
If the pointer of the volt-ohm meter swings over the maximum value when DC 12 $\mu$ A (DC 0.03 mA) is used, change the range to a greater one where the pointer does not run over the maximum value while applying the probes to the respective positions. Then, after two or three seconds, return the range to DC 12 $\mu$ A (DC 0.03 mA) again for measuring.

Less than 3.0 $\mu$ A: Normal  
Replace the battery with a new one.  
More than 3.0 $\mu$ A: Defective  
Proceed to **1**.

<sup>\*</sup>Note:  
If the pointer of the Micro Test MT 10 II swings over the maximum value while the current consumption is measured, depress the Current consumption/Voltage indication button (3) so that it is released to indicate the voltage (1.55 V) while the black probe and the red clip are applied. Then, after two or three seconds, depress the Current consumption/Voltage indication button again so that it holds in the pressed in position (4) to indicate the current consumption for measuring.

## Procedures

Check gain and loss of time.

1. Set up the Quartz Tester.
2. Measuring



CHECK ACCURACY

Check to see if the watch functions correctly and can be adjusted by the button operation.

1. Check the stopwatch function.
  - Check to see if "start", "stop", "lap", "lap release" and "reset" function correctly.
2. Check the counter function.
  - Check to see if seconds can be counted correctly or can be reset to "00" second.
3. Check the time and calendar setting function.
  - Set the time and calendar digits more than one cycle for each unit and check to see if each digit is advancing correctly.




CHECK FUNCTIONING AND ADJUSTMENT

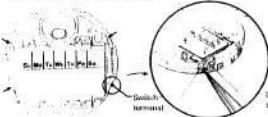

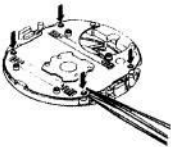
## Result and repair

Does not lose or gain: Normal  
Proceed to the following procedure.  
Loses or gains: Defective  
Proceed to [Time accuracy adjusting]  
Time accuracy is adjusted by turning the trimmer capacitor.

Functions correctly and can be adjusted: Normal  
Wear the watch on the wrist to check time accuracy.  
Does not function correctly or cannot be adjusted: Defective

Proceed to [Replace the circuit block.]

Procedures	Result and repair
<p>(1) Check to see if the bulb lead terminals touch the lead terminal of the circuit block.</p> <p>1. Check to see if the two bulb lead terminals protrude by more than 0.3mm from the backside of the liquid crystal panel frame. And check for any dust, lint and other contamination of the bulb lead terminal.</p>  <p>Protrusion "a" of the bulb lead terminal should be two-thirds or more of the thickness "a" of the liquid crystal panel frame.</p> <p>2. Check for any contamination on the bulb lead terminal of the circuit block.</p> 	<p>Protrude by more than 0.3mm: Normal Protrude by less than 0.3mm: Defective Pull out by using tweezers.</p> <p>No dust, lint or uncontaminated: Normal Proceed to (2). Dust, lint or contaminated: Defective Wipe off any foreign matter.</p>
<p>(2) Check to see if there is a broken filament in the bulb and if there is any break in the welded portion of the bulb lead terminal.</p> <p>1. Set up the volt ohm meter. Range to be used: OHMS R x 1</p> <p>2. Measuring Apply the two probes of the volt ohm meter to the bulb lead terminals as shown in the illustration.</p>  <p>Note: Either red or black probe will do.</p>	<p>Bulb lights up: Normal Proceed to (3). Bulb does not light up: Defective Proceed to [Replace the liquid crystal panel frame.]</p>

Procedures	Result and repair
<p>Check to see if the switch spring functions correctly.</p> <p>(1) Check to see if the switch springs [four arrow-marked portions shown in the illustration below] function correctly when they are pushed in.</p> <p>1. Check to see if the four arrow-marked springs touch the switch terminals of the circuit block when they are pushed in with the tips of tweezers and that they do not touch the switch terminals of the circuit block when released.</p>  <p>2. Check for dust, lint and other contamination on the contacting portions.</p> <p>(2) Check to see if the lead terminal of the switch spring touches the lead terminal of the circuit block.</p> <p>1. Check to see if the two arrow-marked portions touch correctly when the liquid crystal panel frame is disassembled.</p>  <p>2. Check for dust, lint and other contamination on the connecting portions.</p> <p>(3) Check to see if the pins for the switch terminals are fixed firmly in the circuit board. Check to see if the four arrow-marked pins for the switch terminals are fixed firmly in the circuit board by slightly lifting the circuit board with tweezers as shown in the illustration on the right.</p> 	<p>Functions correctly: Normal Does not function correctly: Defective</p> <p>If the switch springs do not function correctly after they are adjusted, replace them with new ones.</p> <p>No dust, lint or uncontaminated: Normal Proceed to (2). Dust, lint or contaminated: Defective Wipe off any foreign matter.</p> <p>Touch: Normal Do not touch: Defective Adjust by using tweezers so that the lead terminal of the circuit block touches the switch spring.</p> <p>No dust, lint or uncontaminated: Normal Proceed to (3). Dust, lint or contaminated: Defective Wipe off any foreign matter.</p> <p>Fixed firmly: Normal Proceed to Replace the circuit block. (Defective CMOS LSI) Not fixed firmly: Defective Replace the circuit block. (The pins for the switch terminals are not fixed firmly.)</p>

