TECHNICAL GUIDE

AND

PARTS LIST

CAL. Y780A
CAL. Y786A
CAL. Y789A

DIGITAL QUARTZ

CONTENTS

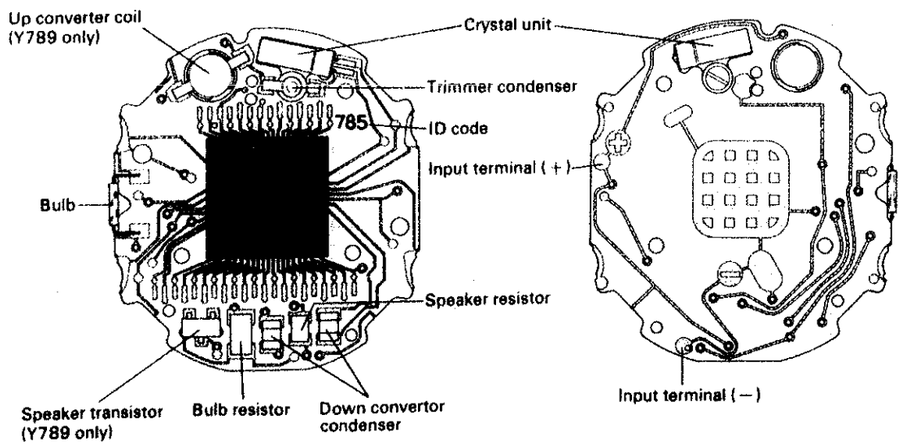
I. SPECIFICATIONS

Item \ Cal. No.	Y780A	Y786A	Y789A
Display medium	Nematic Liquid Crystal, FEM (Field Effect Mode)		
Display system	Time function (12 or 24 hour indication)	←	←
	Time setting function	←	←
		Stopwatch function	←
			Alarm function
Additional mechanism	Pattern segment checking system	←	←
	Illuminating light	←	←
	Auto return function	←	←
	System reset function	←	←
			Alarm test system
Loss/gain	Loss/gain at normal temperature range Monthly rate: Less than 20 seconds		
Casing diameter	ϕ28.1 mm		
Height	4.9 mm		
Liquid crystal panel drive system	1/2 multiplex		
Regulation system	Trimmer condenser		
Measuring gate	Any gate is available.		
Battery	Lithium battery: MATSUSHITA BR2016, MAXELL CR2016 Voltage: 3.0V		
Battery life	Approx. 6 years	Approx. 5 years	Approx. 4 years

II. CIRCUIT BLOCK SCHEMATIC

The circuit block can be distinguished by the ID code and existence of alarm parts.

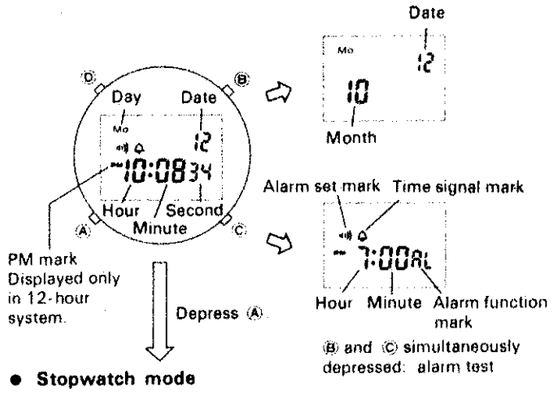
ID code: Y780 – 787
Y786 – 786
Y789 – 785 or without code



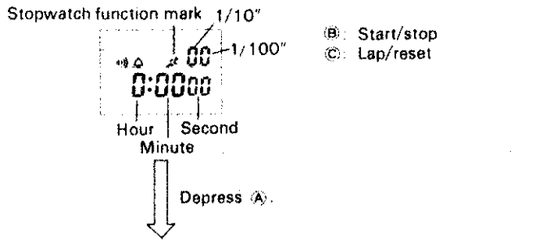
III. DISPLAY FUNCTION

<Y789A>

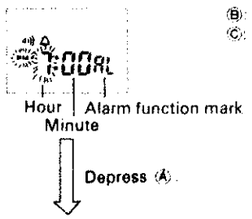
- **Time mode**



- **Stopwatch mode**



- **Alarm mode**

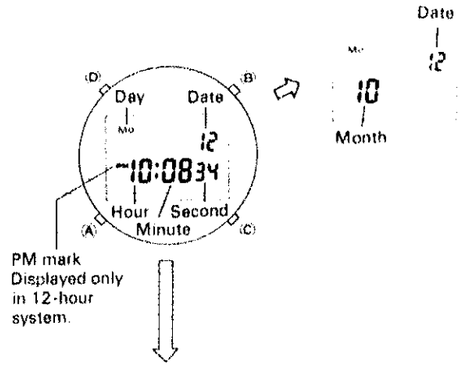


- **Time setting mode**

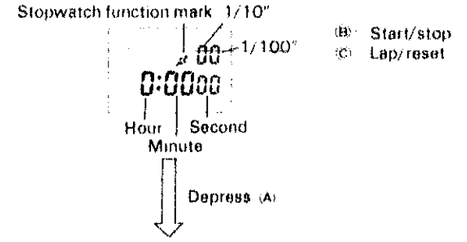
- **Pattern segment checking system**
  In all Cal. No. models, the pattern segment checking system can be obtained when the buttons Ⓑ and Ⓒ are depressed simultaneously in the time setting mode.
- **System reset function**
  In any mode, simultaneously depressing buttons Ⓐ, Ⓑ, Ⓒ and Ⓓ will function the system reset. With the system reset operation, the time display changes as follows.
  Time mode 1:00:00 Jan. 1st SUN
  Stopwatch mode Reset condition (0:00:00)
  Alarm mode 1:00 AL (Both alarm and time signal are OFF.)
  It is recommended to use this mode to check mode or to set time when servicing the watch.

<Y786A>

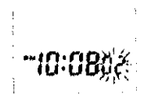
- **Time mode**



- **Stopwatch mode**

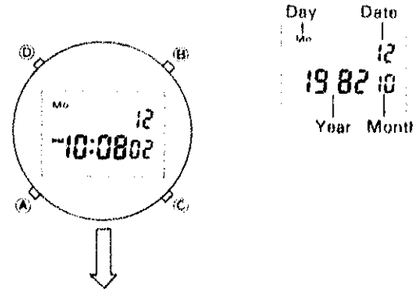


- **Time setting mode**



<Y780A>

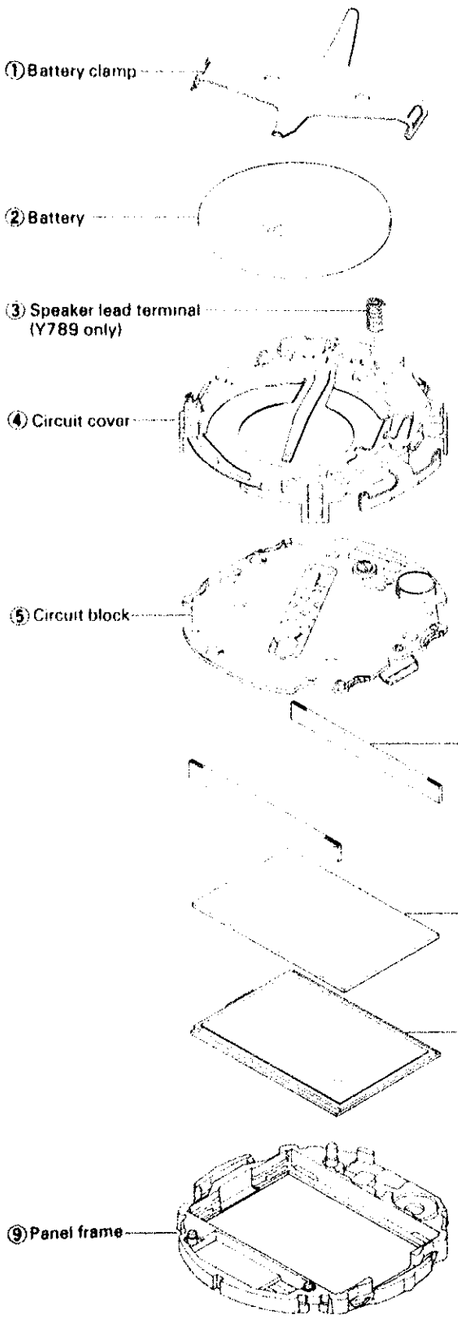
- **Time mode**



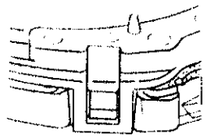
- **Time setting mode**

IV. DISASSEMBLING AND REASSEMBLING

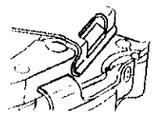
1. Disassembling and reassembling of the module



NOTE:
The battery clamp should be engaged with the projection of the circuit cover side surface in the buttons (D) and (C) side.



NOTE:
The engagement between the panel frame and circuit cover is as shown in the figure below.
As the engagement parts are made from plastic, do not disengage them forcibly.
(Pry out the green engagement part with tweezers.)

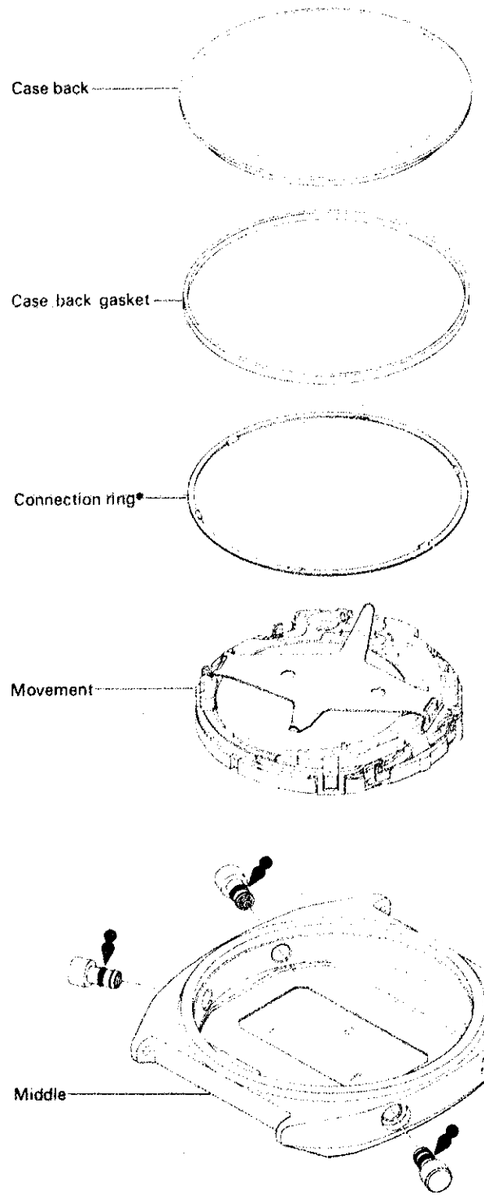


NOTE:
Identification of 6H and 12H direction
When the panel frame is viewed from the direction in which the circuit block is inserted, the side in which the circular hole is provided is 12H side and the side in which the square hole is provided is 6H side. Install the panel frame in the correct direction.

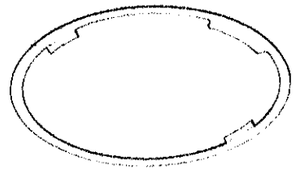
2. Disassembling and reassembling of the case

The case back of the Y78 series is fixed to the middle with plastic gasket.
The button with the gasket is directly inserted into the button hole from the outside. When disassembling and reassembling the button, pay attention to the NOTE below.

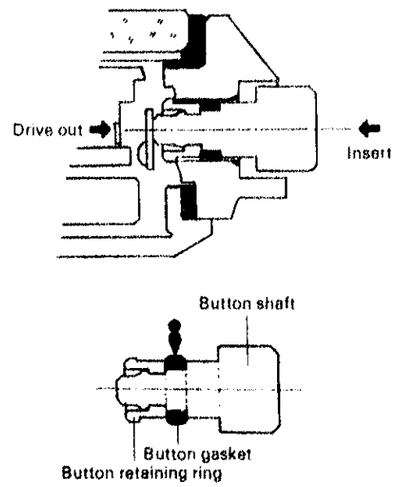
Lubrication: Silicone grease



* Some model uses a connection ring like shown below.

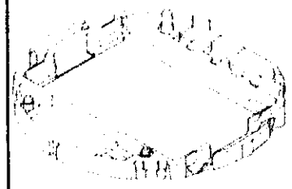


NOTE:
Construction and handling of button
- For normal servicing, it is not necessary to remove the button.
- When removing the button, depress the button retaining ring with tweezers
- Do not remove the button retaining ring
  After installing the button, confirm that the button is not removed when the button is pulled with tweezers.



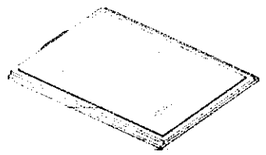
3. Cleaning

How to clean

Name of parts	Cleaning	Drying	Solution	Remarks
Connector	Rinse or wash with a soft brush.	Warm air	Alcohol	● Clean the contacting portion between the connector and liquid crystal panel, and circuit block. ● Never use benzene, or trichloroethylene as these will melt the parts. ● Do not set the connector until it is completely dry.
Plastic parts ● Panel frame  ● Circuit cover	Rise or wash with a soft brush.	Warm air	Alcohol or benzene	
Metal parts ● Battery clamp	Clean with a cleaner, rinse or gently wash with a soft brush.	Warm or hot air	Alcohol, benzene or trichloroethylene	

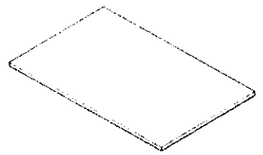
★ Parts that must not be cleaned

Circuit block



Liquid crystal panel

Battery

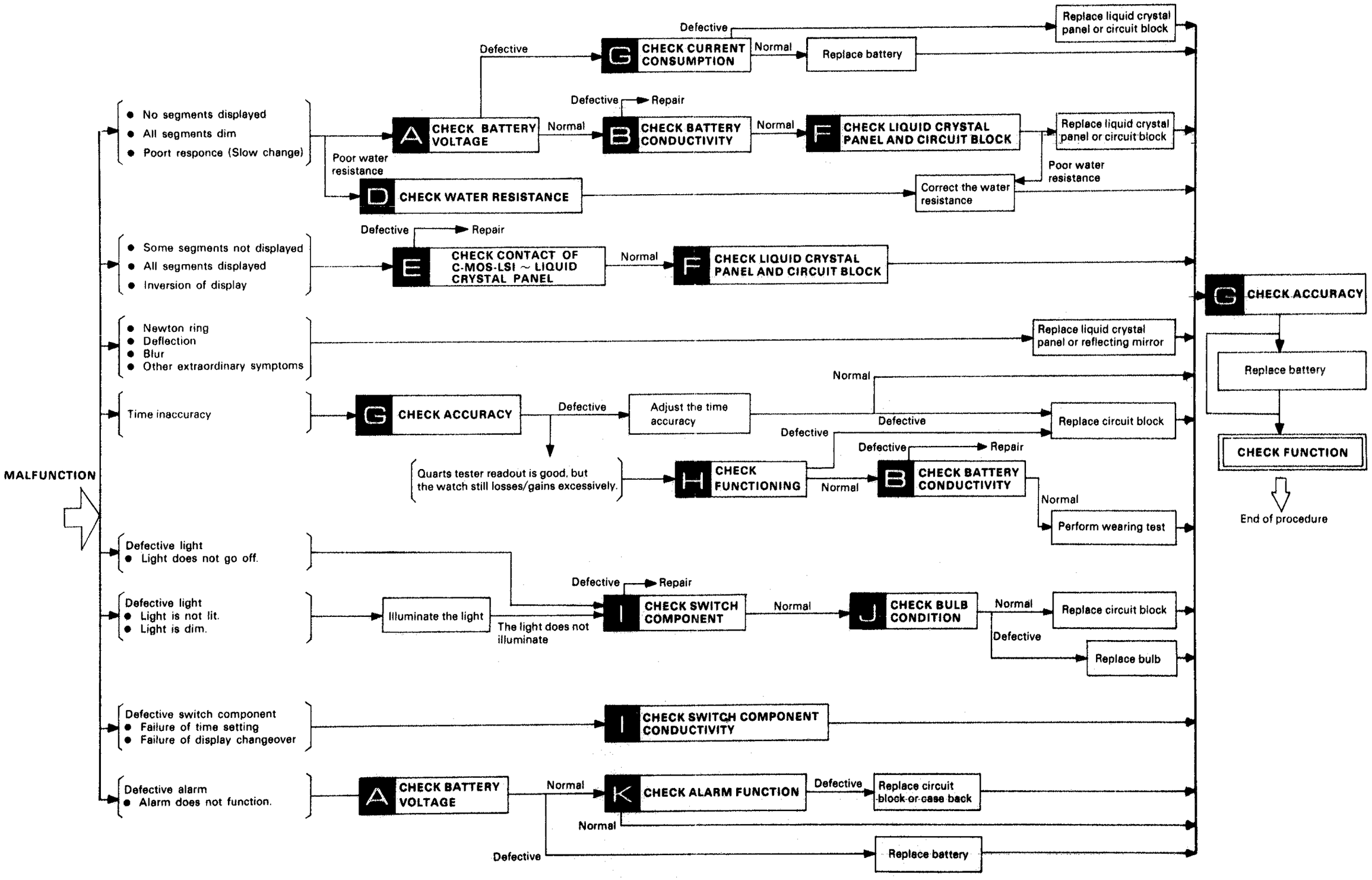


Reflecting mirror

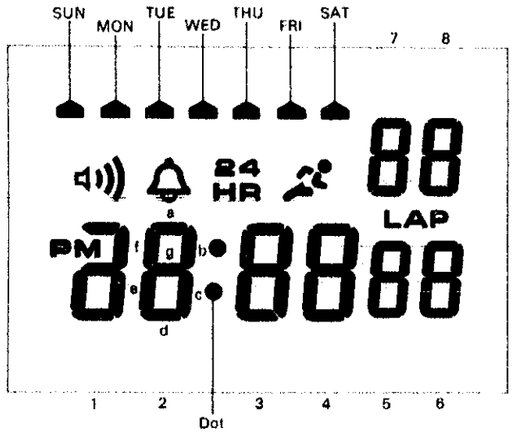
- Only the conductive portions should be wiped with a cloth moistened with benzene and dried with warm air.
- Remove dust and lint with a brush.
- Be careful not to scratch the front surface of the reflecting mirror.

V. CHECKING AND ADJUSTMENT

1. Guide table for checking and adjustment



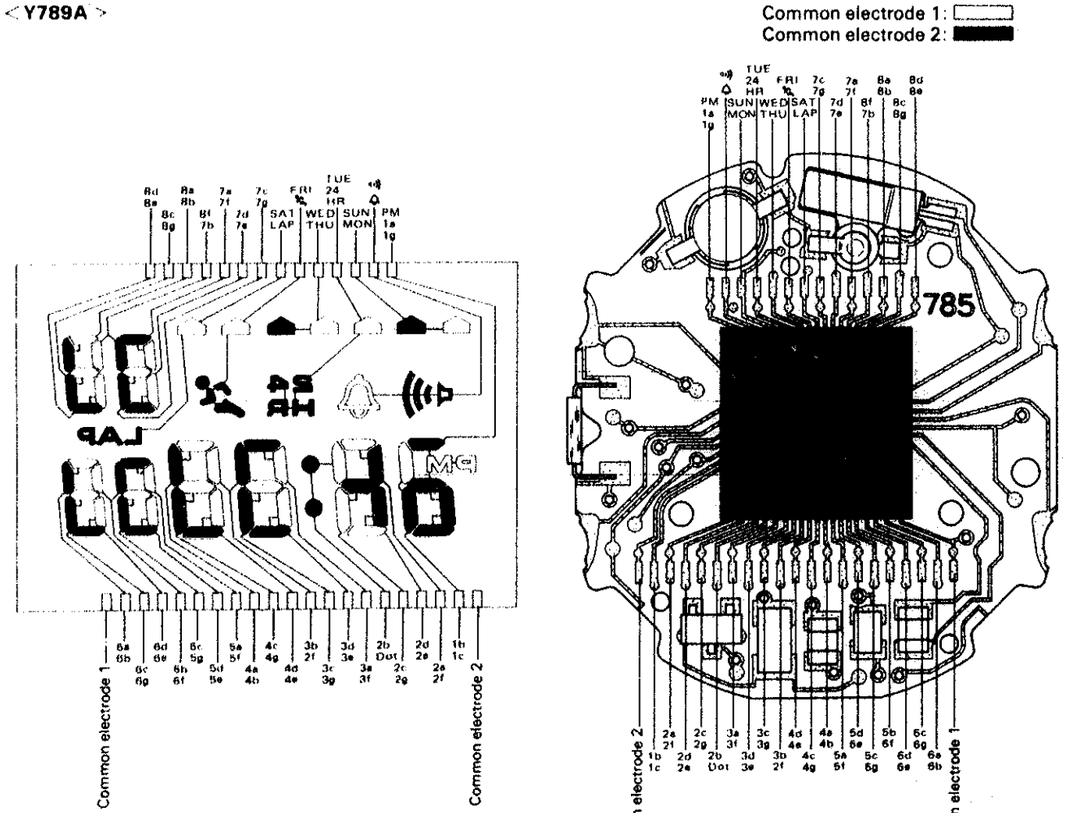
2. Relationship between the segments (Liquid Crystal Panel electrodes) and C-MOS-LSI output terminals



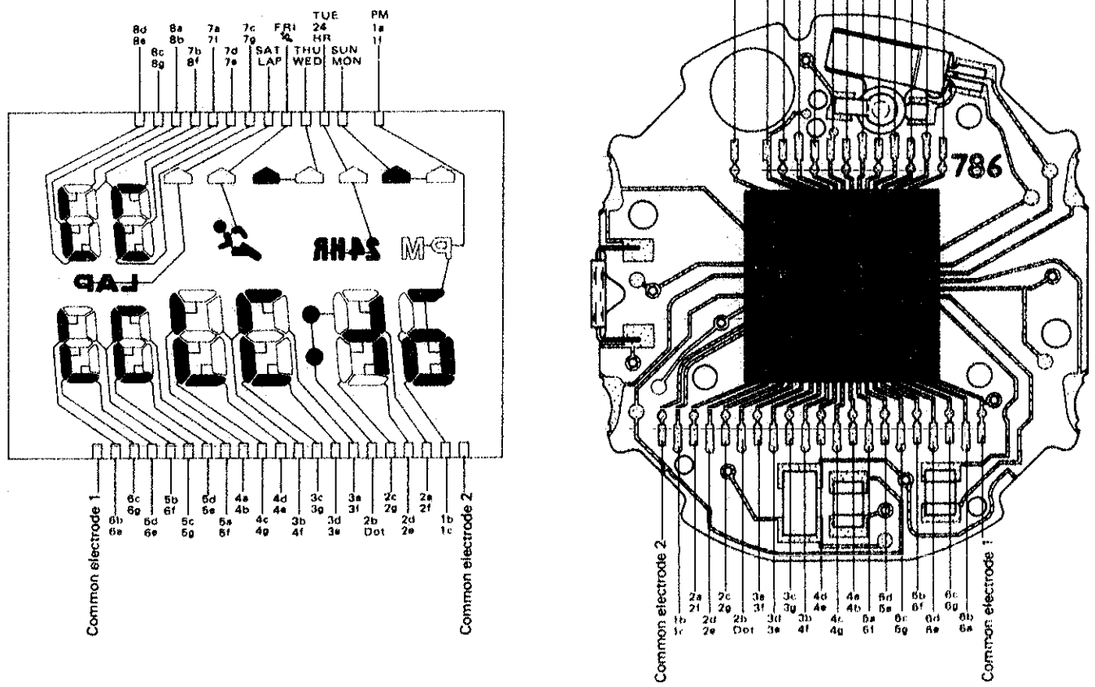
The left illustration shows the panel display of the Y789.
Some of the Y786 and Y780 panel differ.
For details of each panel display, refer to the illustrations below.
(In each Cal. No. models, two types of day indication (indicator system and letter system) are available.)

< Y789A >

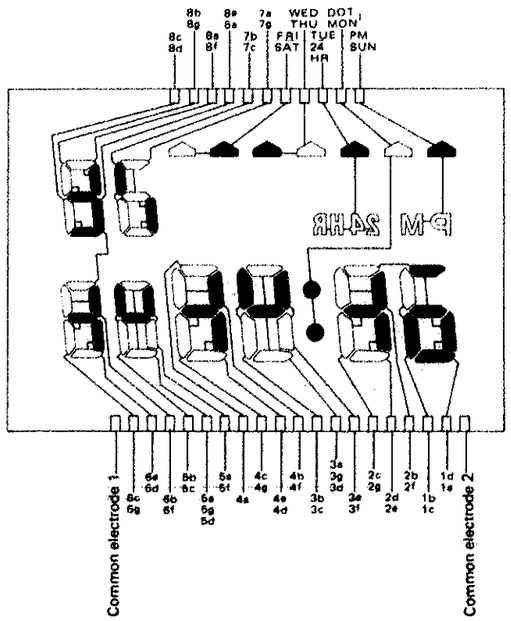
Common electrode 1: ☐
Common electrode 2: ■

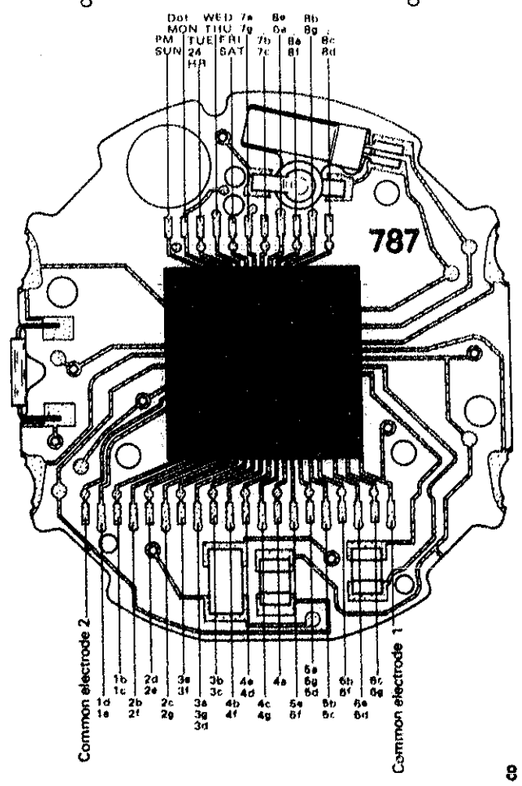


< Y786A >



< Y780A >

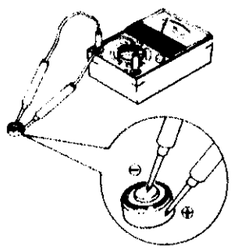




3. Procedure for checking and adjustment

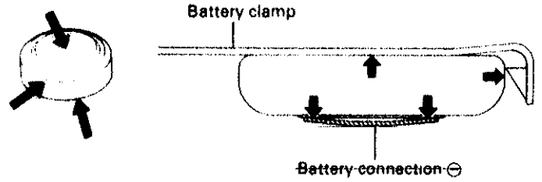
CHECK BATTERY VOLTAGE

A

Procedure	Adjustment and repair
 **NOTE:** If the battery surface is protruded, the battery is defective. This sometimes occurs due to large current. When this sympton is noticed, replace the battery. (Protrusion: 0.2 ~ 0.3 mm)	2.8V or more: Normal Less than 2.8V: Defective (Refer to note below.) **NOTE:** When the light is illuminated, alarm is functioned or battery is short-circuited, the battery voltage tempolarily drops. When the battery voltage is in 2.6 ~ 2.8V, leave the battery for 2 ~ 3 minutes, then measure the battery voltage. If the battery voltage is still less than 2.8V, replace the battery. If the display goes out with the light lit, replace the battery even when the voltage is more than 2.8V.

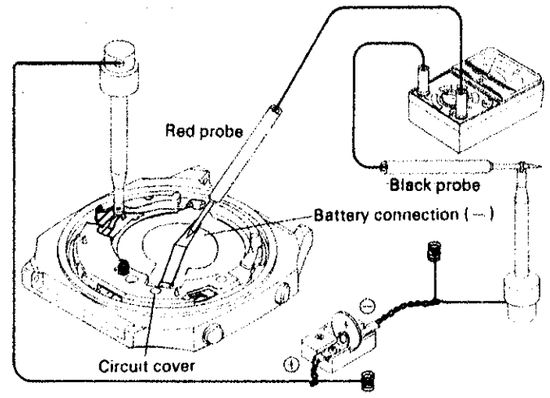
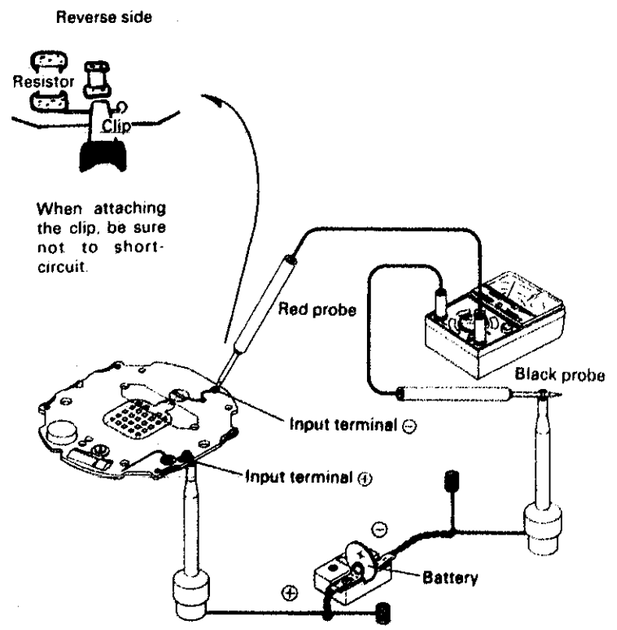
CHECK BATTERY CONDUCTIVITY

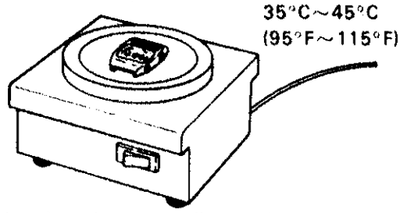
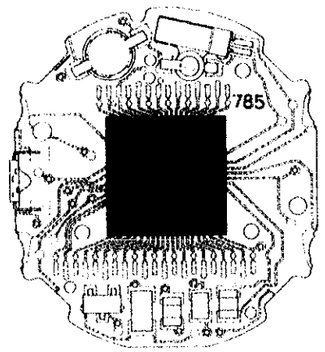
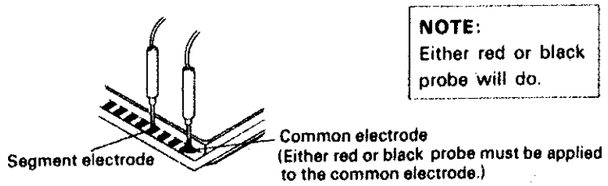
B

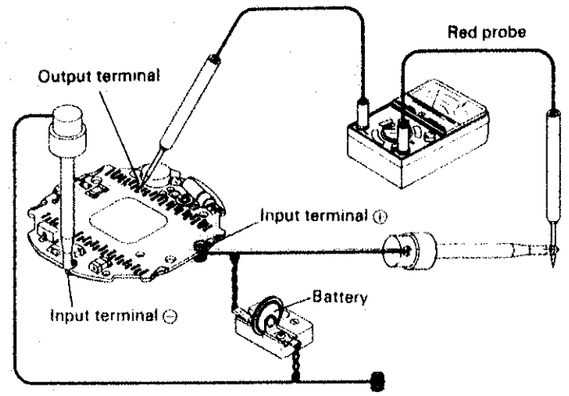
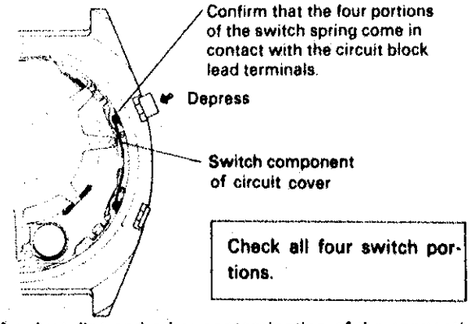
Procedure	Adjustment and repair
Check battery, (battery clamp) and battery connection (—) for contamination. 	Uncontaminated: Normal Proceed to F Contaminated: Defective Clean Poor water resistance is found: Defective Correct the water resistance

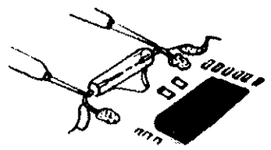
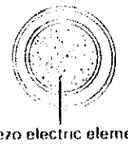
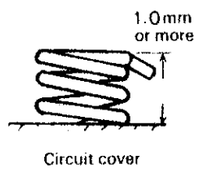
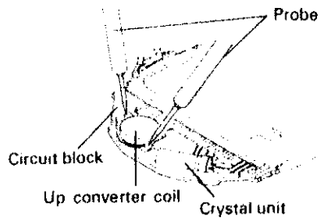
CHECK CURRENT CONSUMPTION

C

Procedure	Adjustment and repair
1. Total current consumption of module 	Less than 1.7μA: Normal 1.7μA or more: Defective Replace circuit block or liquid crystal panel.
2. Current consumption of circuit block 	Less than 1.5μA: Normal 1.5μA or more: Defective Replace the circuit block.

	Procedure	Adjustment and repair
D CHECK WATER RESISTANCE	Check for moisture in the watch. 1. Place the watch on a hot plate and heat it for 15 minutes.  2. Check that the glass does not collect moisture.	Does not collect moisture: Normal Proceed to A Collects moisture: Defective Correct water resistance. Refer to Watch Case Servicing Guide.
E CHECK CONTACT OF C-MOS-LSI LIQUID CRYSTAL PANEL	Check for dust, lint and other contamination on the liquid crystal panel electrodes and connectors.  	Uncontaimated: Normal Proceed to F Contaminated: Defective Wipe off any foreign matter.
H CHECK LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK	• Check that the liquid crystal panel and circuit block function correctly. (Refer to "Relationship between the segments (liquid crystal panel electrodes) and C-MOS-LSI output terminals" on page 7.) 1. Checking the liquid crystal panel (1) Set up the Volt-ohm-meter. Range to be used: OHMS R × 1 ~ R × 1K **NOTE:** Any range will do if more than 3V is applied to the terminal of the Volt-ohm-meter. In some volt-ohm-meters, a voltage of more than 3V cannot be applied to the terminal. In this case, all segments are not displayed. Use a higher resistance range (R × 10K). (2) Remove the liquid crystal panel from the module and turn it to the reverse side. (3) Check that the corresponding segment is displayed. **NOTE:** Either red or black probe will do.  2. Checking the circuit block output (1) Set up the Volt-ohm-meter. Range to be used: DC 3V (2) Set up the circuit block. Disassemble the module and remove the circuit block.	Displayed: Normal Proceed to F (2). Not displayed: Defective Replace the liquid crystal panel.

	Procedure	Adjustment and repair
F CHECK LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK	3. Supply power to the circuit block by connecting the power supplier as shown in the illustration below.  4. Checking Red probe (+): Circuit block output terminal Black probe (−): C-MOS-LSI output terminal (If display is defective, apply to the corresponding C-MOS-LSI terminal.)	0.8V or more: Normal (The voltage at all terminals should be 0.8V or more.) Return to E Less than 0.8V: Defective Replace the circuit block.
G CHECK ACCURACY	1. Measuring mode Set the watch in the mode in which the indication does not change (pattern segment mode, etc.). 2. For the measurement, any gate can be used. 3. Adjust the level. 4. Measure the accuracy.	Does not loss/gain: Normal Loses/gains: Defective Adjust the trimmer condenser to obtain good accuracy. If the accuracy cannot be obtained, replace the circuit block.
H CHECK FUNCTIONING	Check the functioning referring to "Display function" on page 2. 1. Check that the time mode and calendar mode are changed correctly. 2. Check the alarm function, then confirm that the alarm set mark and the time signal mark are displayed correctly. 3. Check the functioning for each digit in the time and calendar modes and confirm that the digit is advanced correctly.	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 Replace the circuit block.
I CHECK CONDUCTIVITY OF SWITCH COMPONENT	1. Check that the switch spring functions correctly.  Check all four switch portions. 2. Check for dust, lint and other contamination of the connecting portions.	Functions correctly Normal Does not function correctly: Defective Correct the switch spring with tweezers or replace the circuit case. Uncontaminated: Normal Contaminated: Defective Wipe off any foreign matter.

	Procedure	Adjustment and repair
J CHECK BULB CONDITION	Check that there is a broken filament in the bulb. (1) Set up the Volt-ohm-meter. Range to be used: OHMS R × 1 (2) Checking Apply two probes of the Volt-ohm-meter to the bulb leads as shown in the illustration.  Either red or black probe will do.	Bulb lights up: Normal Bulb does not light up: Defective Replace the bulb with a new one.
K CHECK ALARM FUNCTION	(Y789 only) 1. Check the contacting portion of the piezo electric element and speaker lead terminal for contamination and check the speaker lead terminal for deformation.  Piezo electric element **NOTE:** The distance between the circuit cover and top of speaker lead terminal should be more than 1.0 mm. (Should be measured when fully inserted.)  1.0mm or more Circuit cover	Uncontaminated: Normal Contaminated. Defective Wipe off any foreign matter. Deformed: Defective Correct with tweezers.
	2. Measure the up converter coil resistance of the circuit block to check for a short circuit and a broken wire. Range to be used: OHMS R × 1 ●Checking Attach the probes to the up convertor coil terminals. Either red or black probe will do.  Probe Circuit block Up converter coil Crystal unit	50Ω ~ 90Ω: Normal Less than 50Ω (Short circuit): Defective More than 90Ω (broken wire): Defective Replace the circuit block.

How to check for battery electrolyte leakage and repair

1. Remove the module from the case.
2. Disassemble the module.
3. Wipe off any electrolyte from the circuit block.
   (1) Wipe off the electrolyte with cloth moistened with alcohol.
   (Pay attention to the connecting portions.)
   (2) Dry with warm air by using a dryer.

   NOTE:
   If the electrolyte leakage is excessive, replace the circuit block.
   Use a lint-free cloth.
4. Clean other parts (Circuit cover and panel frame).
   (1) Wipe off battery electrolyte on the other parts with a soft brush moistened with alcohol.
   (2) Dry with warm air by using a dryer.

   NOTE:
   If the part is damaged, replace with a new one.
5. Reassemble the module.
   Replace the battery with a new one.
6. Check function and current consumption.

PARTS LIST CAL. Y780A/786A/789A

PART NO.			PART NAME
Y780A	Y786A	Y789A	
4001 787	4001 786	4001 785	Circuit block
4225 782	4225 780	4225 788	Battery clamp
4246 795	4246 795	4246 795	Speaker lead terminal
4313 795	4313 795	4313 795	Connector
4398 785	4398 785	4398 785	Liquid crystal panel frame
4410 785	4410 785	4410 785	Circuit cover
★ 4510 765	★ 4510 775	★ 4510 785	Liquid crystal panel
★ 4510 766	★ 4510 776	★ 4510 786	
	★ 4510 777	★ 4510 787	
		★ 4510 123	
4521 840	4521 840	★ 4521 840	Reflecting mirror
		★ 4521 841	
4530 230	4530 230	4530 230	Bulb
MAXELL CR2016	MAXELL CR2016	MAXELL CR2016	Rithium battery
MATSUSHITA BR2016	MATSUSHITA BR2016	MATSUSHITA BR2016	

Remarks:

Liquid crystal panel

★ **4510 765 (Silver)**
★ **4510 775 (Silver)**
★ **4510 785 (Silver)**
★ **4510 123 (Gold)**
} Day indication ..... ⏏ mark

★ **4510 766 (Silver)**
★ **4510 776 (Silver)**
★ **4510 777 (Gold)**
★ **4510 786 (Silver)**
★ **4510 787 (Gold)**
} Day indication ..... English letter

The type of liquid crystal panel is determined based on the design of cases.

Reflecting mirror for Cal. Y789A

★ **4521 840 (Silver)**
★ **4521 841 (Gold)**..... As of June, 1982 this one is not uesd.
However it may be employed in with certain case designs.

82-06. Printed in Japan