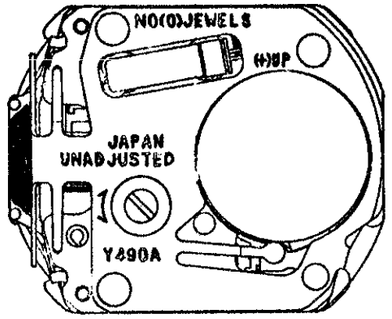
TECHNICAL GUIDE
AND
PARTS LIST

CAL. Y499A

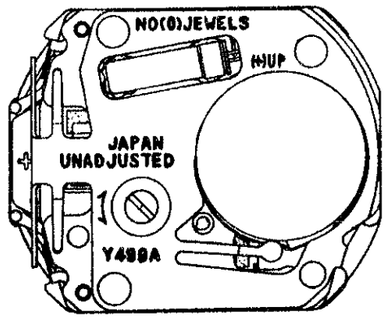
DIGITAL QUARTZ

CONTENTS

|Y490|



|Y499|

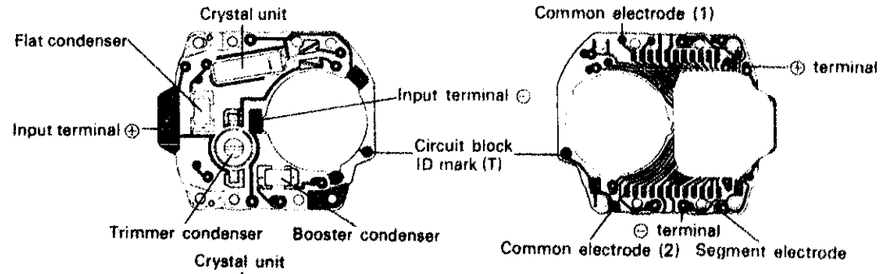


I. SPECIFICATIONS

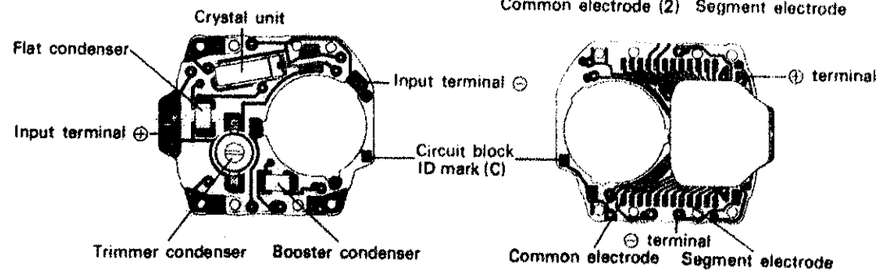
Item \ Cal. No.	Y490A	Y499A
Display medium	Nematic Liquid Crystal, FEM (Field Effect Mode)	
Liquid crystal panel drive system	Multiplex	Static
Display system	● Time display Hour, minute and second: 12-hour digital display system ● Calendar display (Day and date) The calendar digits are displayed by depressing a button.	● Time display Hour and minute: 12-hour display system The second digits are displayed by depressing a button. ● Calendar display (Month, day and date) The calendar digits are displayed by depressing a button.
Additional mechanism	● Second setting device ● Automatic calendar system (Automatically adjusts for leap years.)	● Automatic calendar system (Automatically adjusts for leap years.)
Loss/gain	Loss/gain at normal temperature range Monthly rate: less than 20 seconds (Annual rate: less than 4 minutes)	
Maximum diameter	18.2 mm	
Casing diameter	ϕ17.5 mm (14.0 mm between 6 o'clock and 12 o'clock sides, 17.0 mm between 3 o'clock and 9 o'clock sides)	
Height	4.7 mm without battery	
Regulation system	Trimmer condenser	
Quartz tester measuring gate	Any gate is acceptable.	
Battery	Silver oxide battery: Maxell SR726SW or UCC397 Battery life: approx. 2 years Voltage: 1.55V	Silver oxide battery: Maxell SR726SW Battery life: approx. 2 years Voltage: 1.55V

II. CIRCUIT BLOCK SCHEMATIC

|Y490|

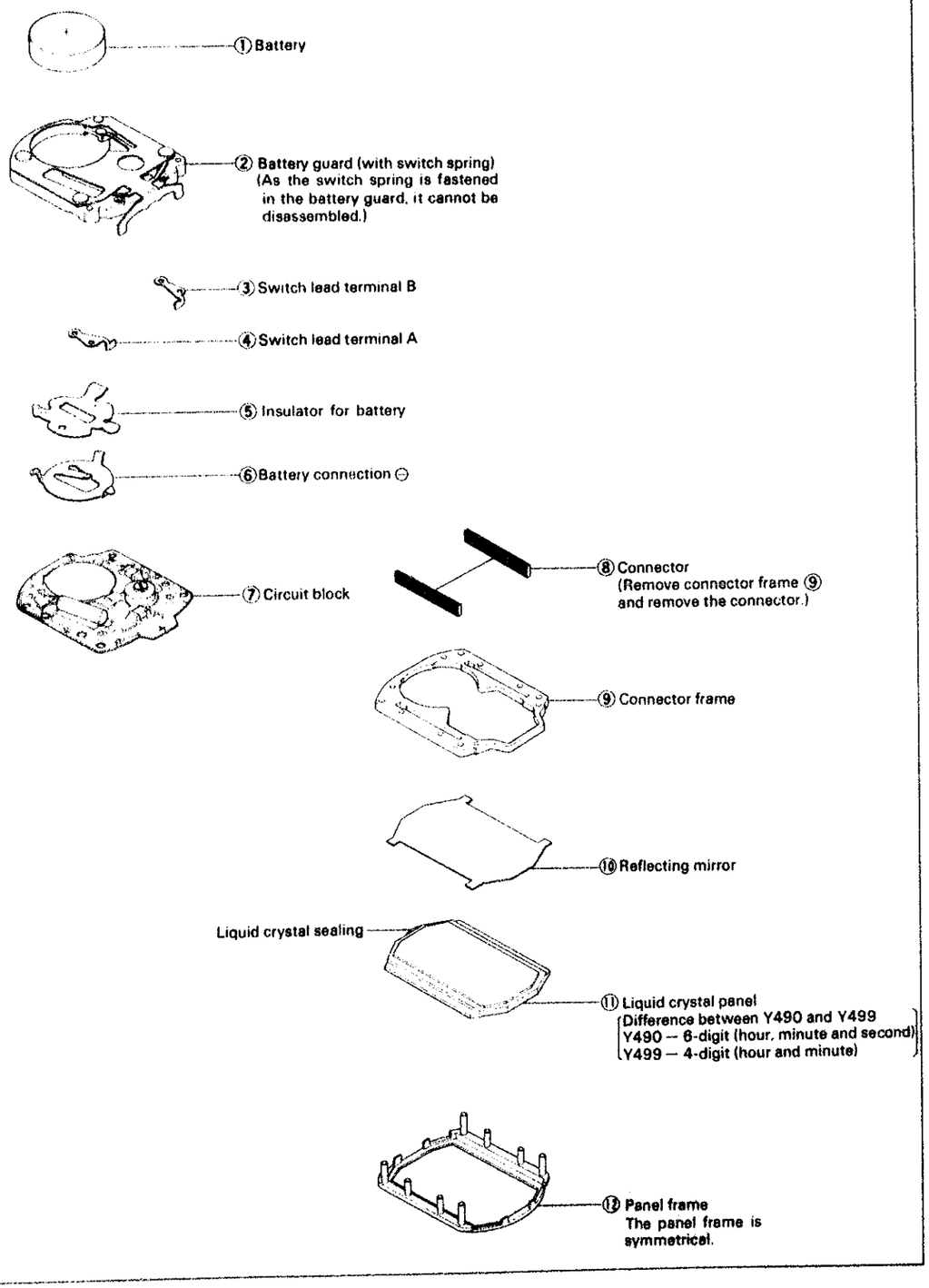


|Y499|



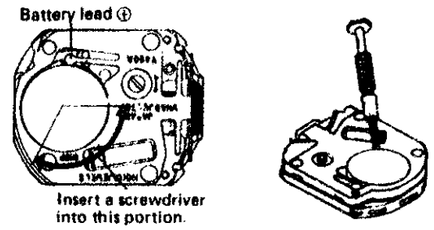
III. DISASSEMBLING AND REASSEMBLING OF THE MODULE

Disassembling procedures Figs.: ① → ⑫
Reassembling procedures Figs.: ⑫ → ①

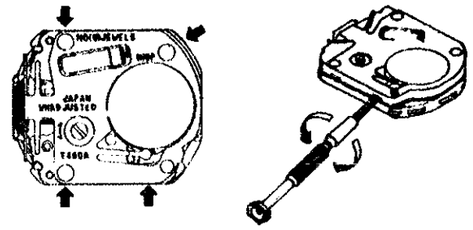


Remarks for disassembling and reassembling

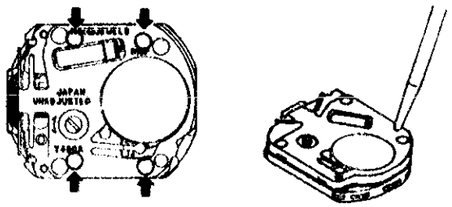
① Battery
- Insert a screwdriver into the portion indicated by the arrow in the illustration on the right and remove the battery. Inserting the screwdriver in any location other than the portion specified by the arrow could damage the battery lead ⊕.



② Battery guard
[Removal]
- Insert a screwdriver into four cut-offs of the battery guard and remove it by turning the screwdriver.

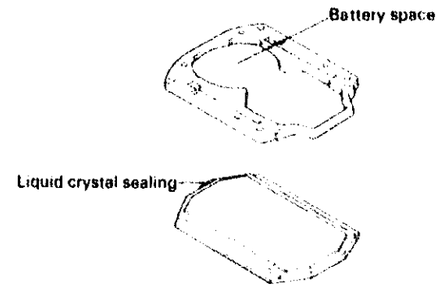


[Installation]
- Place the battery guard so that the guard is engaged by the four pins. Depress the four portions indicated by the arrows to secure the battery guard.
- When installing the battery guard, take care not to misalign the switch lead terminals A and B.



③ and ④ Switch lead terminals A and B
- Install the switch lead terminals A and B onto the circuit block pins.

⑨ Connector frame
- Install the connector frame so that the liquid crystal sealing is placed in the battery space.
- As the connector frame is symmetrical, the frame can be installed even on the reverse side.

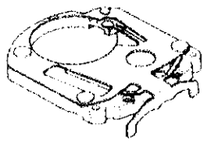


IV. CLEANING

1. How to clean

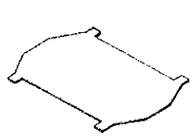
Parts Name	Cleaning	Drying	Solution	Remarks
Connector 	Rinse or wash with a soft brush.	Warm air	Alcohol	• Clean the contacting portion between the connector and liquid crystal panel, and circuit block. • Never use benzene, Diaflon S-3 or trichloroethylene as these will melt the parts. • Do not set the connector until it is completely dry.
Plastic parts Panel frame Battery insulator	Rinse or wash with a soft brush.	Warm air	Alcohol, benzene or Diaflon S-3	
Others (except 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

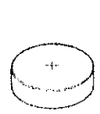


Circuit block

Liquid crystal panel



Reflecting mirror



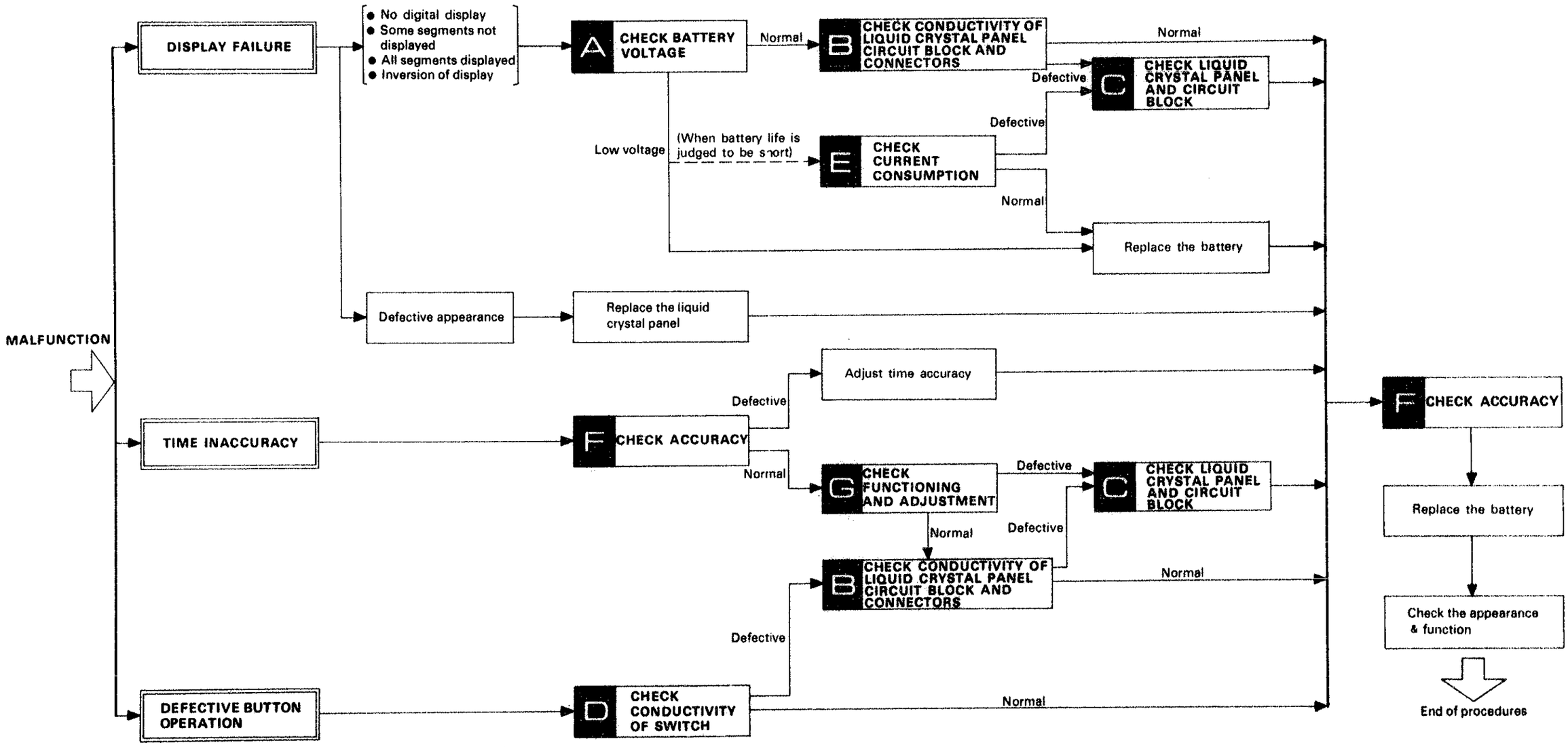
Battery

- 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.

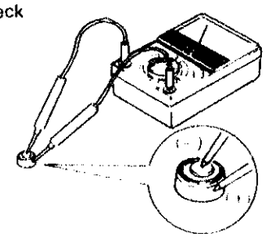
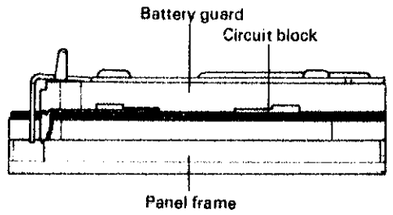
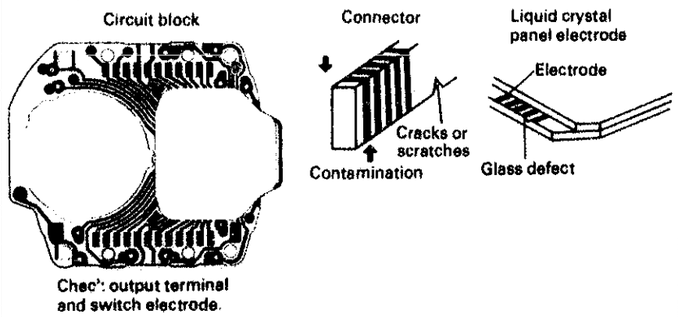
V. CHECKING AND ADJUSTMENT

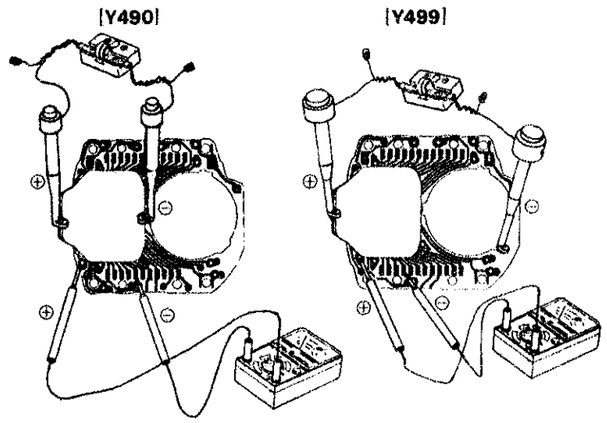
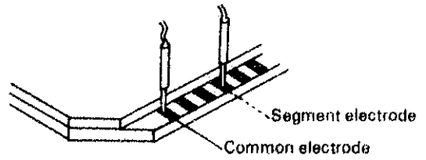
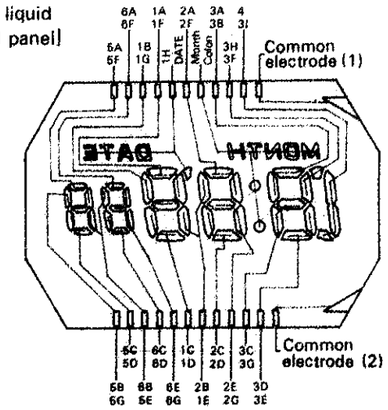
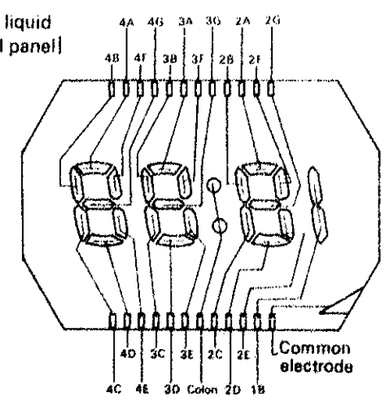
Be sure to use the static electricity protector when handling the module.

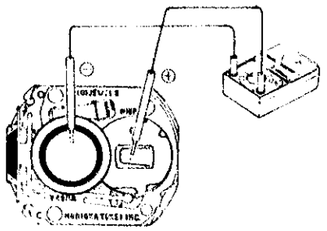
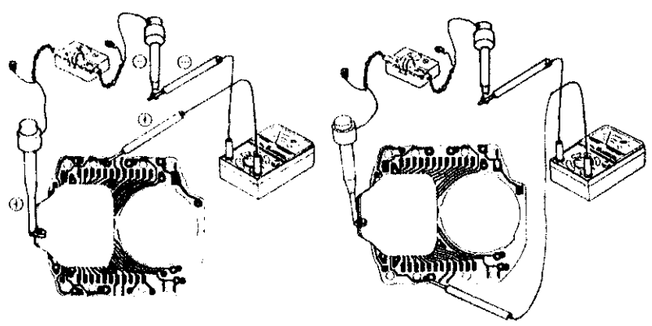
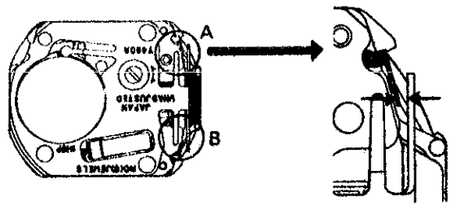
1. Guide table for checking and adjustment

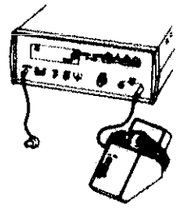
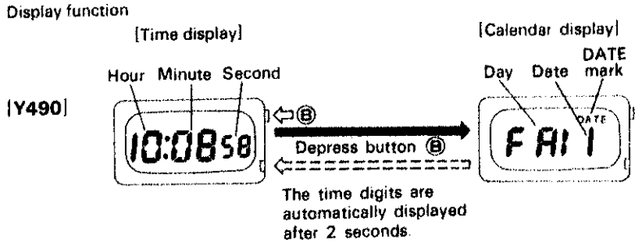


2. Procedures for checking and adjustment

	Procedures	Adjustment and repair
A BATTERY VOLTAGE	Use the following procedures to check battery voltage. ● Set up the volt-ohm-meter. Range to be used: DC 3V ● Measuring Red Probe ⊕ ..... Battery surface ⊕ Black Probe ⊖ ..... Battery surface ⊖ 	More than 1.5V: Normal Less than 1.5V: Defective Replace the battery with a new one.
PATTERN SEGMENT CHECKING SYSTEM	Depress button Ⓐ for 3 or 4 seconds to find the defective segments. [Time measurement can be checked easily in this mode.] **Note:** The pattern segment checking system is not provided in Y499. 	One segment does not light up: Replace the liquid crystal panel with a new one. More than 2 segments do not light up: Proceed to **B**
B CONDUCTIVITY OF LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTOR	(1) Check for any gap between the circuit block and battery guard. 	No gap: Normal Gap: Defective Re-insert the battery guard onto the panel frame.
	(2) Check for any scratches, cracks, breaks, or contamination such as dust and lint. 	Uncontaminated: Normal Contaminated: Defective Wipe off any foreign matter. No scratches, cracks or breaks: Normal Scratched, cracked or broken: Defective Replace the connector with a new one.

	Procedures	Adjustment and repair
C CIRCUIT BLOCK AND LIQUID CRYSTAL PANEL	(1) Check to see if the electric signal flows into the liquid crystal panel from the circuit block correctly. 1) Attach the electricity supply to the circuit block. 2) Set the volt-ohm-meter. Red Probe ⊕.... ⊕ terminal of circuit block Black Probe ⊖.. Segment electrode (Apply the probe to several portions.) [Y490] [Y499] 	More than 0.8V: Normal Less than 0.8V: Defective Replace the circuit block with a new one.
	(2) Check the liquid crystal panel for any broken panel pattern, short circuit, etc. 1) Invert the liquid crystal panel. 2) Set the volt-ohm-meter. Range to be used: OHMS RX1 (more than 3V) 3) Apply the probe to both common electrode and segment electrode. (Either red or black probe will do.)  ● Segment electrode of liquid crystal panel (Common electrode (1) corresponds to ▨ segment. Common electrode (2) corresponds to ▭ segment.) [Y490 liquid crystal panel]  [Y499 liquid crystal panel] 	Lights up: Normal Does not light up: Defective Replace the liquid crystal panel with a new one.

	Procedures	Adjustment and repair
D CURRENT CONSUMPTION	Check to see if the current consumption is normal. (1) Set the volt-ohm-meter. Range to be used: DC12 μA (2) Measuring Red Probe ⊕ ..... Battery connection ⊖ Black Probe ⊖ .... Battery surface ⊕ 	[Y490] Less than 1.2 μA: Normal Replace the battery with a new one. More than 1.2 μA: Defective Proceed to B. [Y499] Less than 2.2 μA: Normal More than 2.2 μA: Defective Proceed to B.
	● Check the circuit block when the current consumption is large. [Y490] [Y499]  **Note:** If the pointer of the volt-ohm-meter swings over the maximum value when DC 12 μA (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 μA (DC 0.03 mA) again for measuring.	[Y490] Less than 0.8 μA Circuit block: Normal Replace the liquid crystal panel with a new one. More than 0.8 μA Circuit block: Defective Replace the circuit block with a new one. [Y499] Less than 1.8 μA Circuit block: Normal Replace the liquid crystal panel with a new one. More than 1.8 μA Circuit block: Defective Replace the circuit block with a new one.
E CONDUCTIVITY OF SWITCH COMPONENTS	● Check to see if the switch spring functions correctly.  (1) Check to see that the two parts of the springs (A and B) 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. (2) Check for dust, lint and other contamination on the contacting portions.	Functions correctly: Normal Proceed to E (2) Does not function correctly: Defective If the switch spring does not function correctly after it is set correctly, replace the battery guard (with switch spring) with a new one. Uncontaminated: Normal Contaminated: Defective Wipe off any foreign matter.

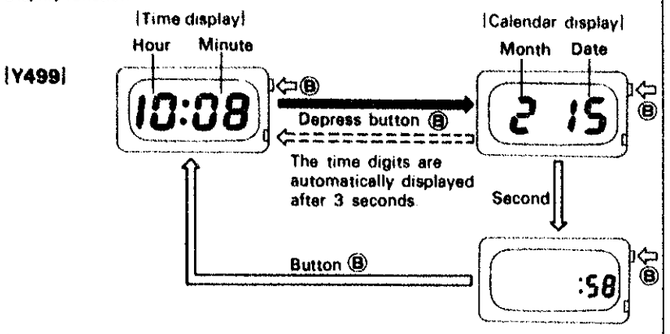
	Procedures	Adjustment and repair
F ACCURACY	Check gain and loss of time. (1) For Y490, depress and hold button Ⓐ for 3 or 4 seconds to display all the segments. In this mode, the time accuracy can be checked easily. The time accuracy of Y499 can be checked in any mode. ● When the adjustment is completed, depress a button to display the time digits. [Y490]  (2) Set up the Quartz Tester. Use a electromagnetic field detection microphone for liquid crystal watches. 	Neither loss nor gain: Normal Loss or gain: Defective Time accuracy is adjusted by turning the trimmer condenser.
G FUNCTIONING	Check to see if the display changes over and adjustments function correctly by button operation. Display function [Time display] [Calendar display] Hour Minute Second Day Date DATE mark [Y490]  Depress button Ⓑ The time digits are automatically displayed after 2 seconds. Function and adjustment  ● Each depression of button Ⓐ will select the digits to be adjusted in the following order. Time digits → second → hour → minute → month → date → day ● One digit (flashing) is advanced by depressing button Ⓑ.	Functions correctly: Normal Does not function correctly: Defective Proceed to B and E Replace the circuit block with a new one.

G

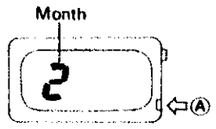
FUNCTIONING

Procedures	Adjustment and repair

Display function



Function and adjustment



- Depressing button Ⓐ twice will display the month digit. Each depression of button Ⓐ will change the display in the following order.

Time display → month → date → hour → minute

- One digit is advanced by depressing button Ⓑ.

All procedures of Disassembling, Reassembling and Adjusting are completed.

VI. PARTS LIST OF MODULE

Cal. Y499A			
PART NO.	PART NAME		
4001 187	Circuit block		
4216 047	Insulator for battery		
4242 186	Switch lead terminal A		
4242 187	Switch lead terminal B		
4270 182	Battery connection (—)		
4313 186	Connector		
4398 189	Liquid crystal panel frame		
4398 193	Connector frame		
*4398 196	Battery guard		
4510 081	Liquid crystal panel (Silver)		
4510 082	Liquid crystal panel (Red)		
4510 083	Liquid crystal panel (Blue)		
4510 084	Liquid crystal panel (Green)		
4510 085	Liquid crystal panel (Gold)		
4521 020	Reflecting mirror		
☆ Maxell SR726SW	Silver oxide battery		

Remarks:

Battery
☆ Maxell SR726SW
☆ UCC397
..... Additional batteries for this calibre may be added as substitutes in the future.

☆ ⊃ Please see remarks

* Battery Guard for Pulsar Watches
4398197 (Pulsar marking)