

TECHNICAL GUIDE AND PARTS LIST

CAL. Y446A

DIGITAL QUARTZ

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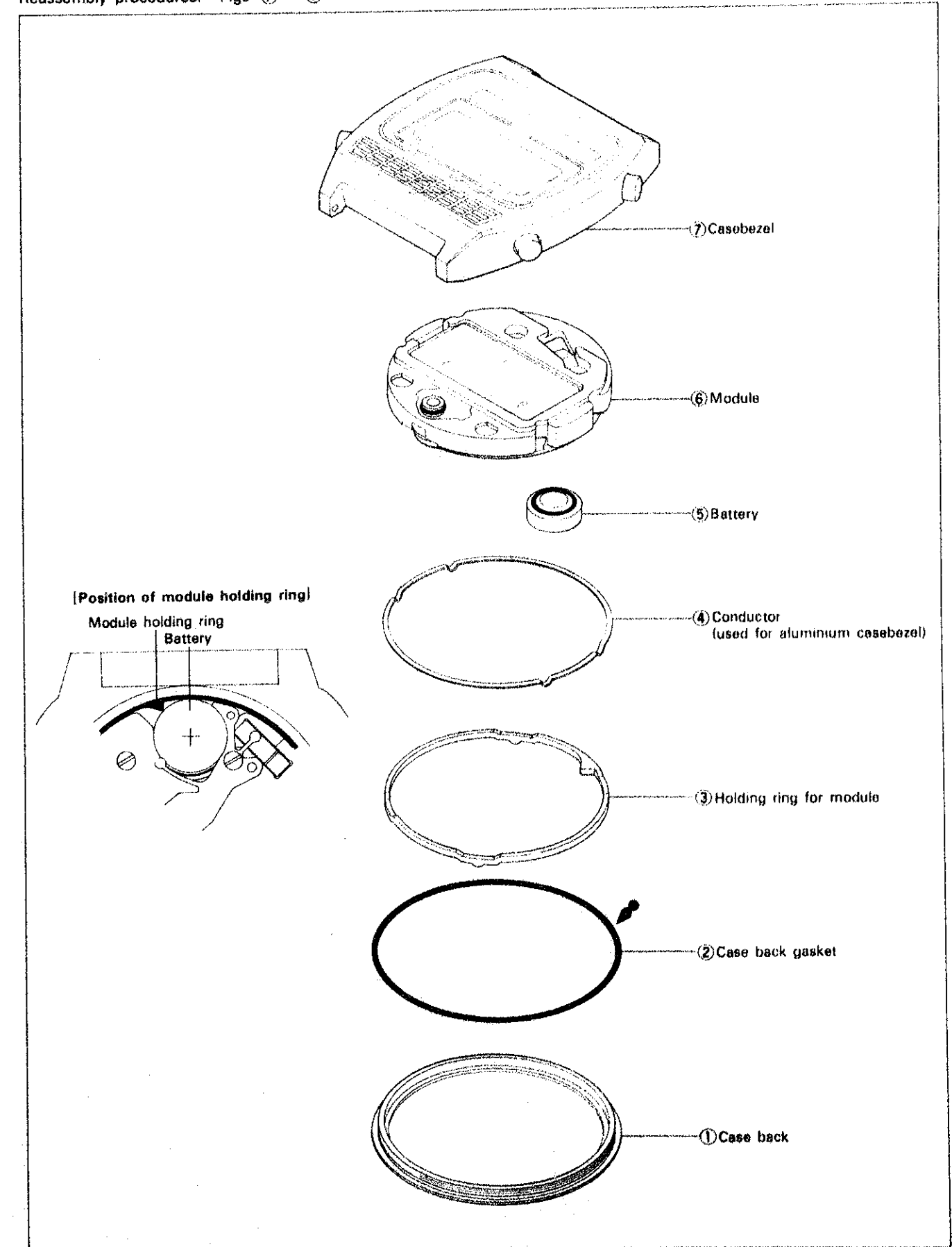
I. SPECIFICATIONS

Item	Cal. No.	Y446A	Y456A
Display medium		Nematic Liquid Crystal, FEM (Field Effect Mode)	
Display system	● Time display	Hour, minute, second and day (indication mark) AM/PM mark, alarm mark 12-hour/24-hour changeover system	Hour, minute, second and day (indication mark) AM mark, alarm set mark 12-hour system
	● Calendar display	Month and date/date and month changeover system, Day (indication mark) Alarm set mark	Month, date and year Day (indication mark) Alarm set mark
	● Alarm display	Hour, minute, A/P, and AM/PM mark Alarm set mark 12-hour/24-hour changeover system	Hour, minute, AM mark and alarm mark Alarm set mark 12-hour system
	● Stopwatch display	Minute, second, 1/10 second → Hour, minute, second (Automatic change) 24-hour system	
Additional mechanism		Illuminating light	
Crystal oscillator		32.768 Hz (Hz = Hertz ... Cycle per second)	
Loss/gain		Loss/gain at normal temperature range Monthly rate: less than 20 seconds (Annual rate: less than 4 minutes)	
Casing diameter		φ 29.5 mm	
Height		5.2 mm without battery	
Operational temperature range		-10°C ~ +60°C (14°F ~ 140°F)	
Regulation system		Trimmer condenser	
Battery		Silver oxide battery: Toshiba WG3, Maxell SR41W Battery life: Approx. 1 year [The light is turned on for 5 seconds and the alarm sounds for 20 seconds a day] Voltage: 1.55V	
IC (Integrated Circuit)		C-MOS-LSI..... 1 unit Transistor 1 unit	

II. DISASSEMBLING, REASSEMBLING AND LUBRICATING OF THE CASE

Disassembly procedures: Figs ① → ⑦
Reassembly procedures: Figs ⑦ → ①

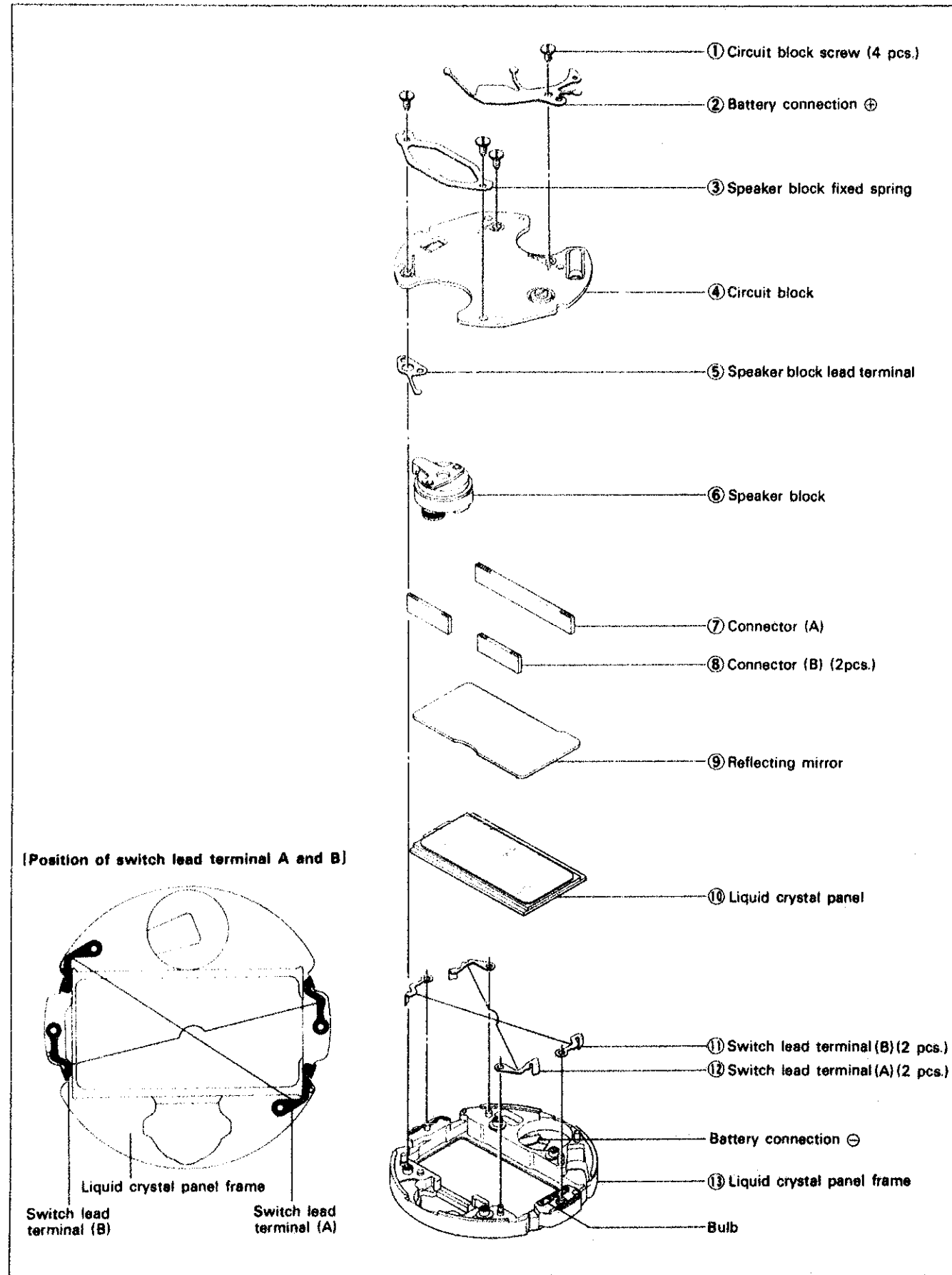
Lubricating: Silicon grease (500,000 c.s.)
Normal quantity ●



III. DISASSEMBLING, REASSEMBLING AND CLEANING OF THE MODULE

Disassembly procedures: Figs ① → ⑬

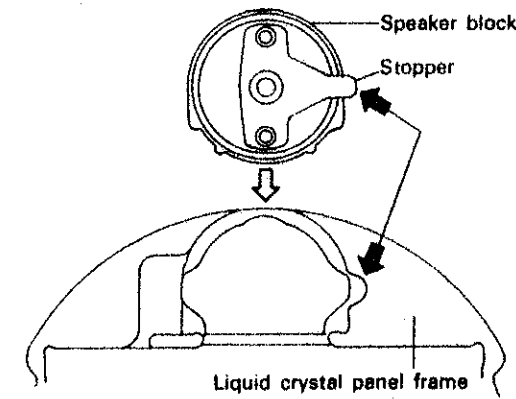
Reassembly procedures: Figs ⑬ → ①



● Remarks for Disassembling and Reassembling

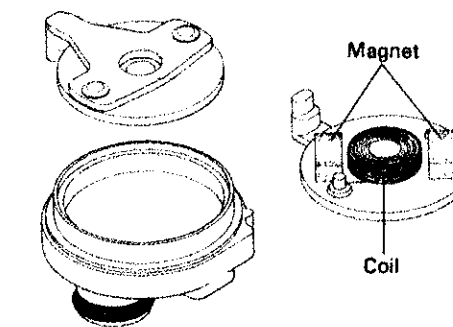
⑥ Speaker block

Set position



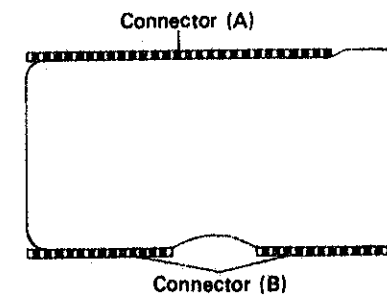
- Set the speaker block with stopper (arrow-marked portions) of the center pole unit of the speaker block into the groove of the liquid crystal panel frame. If the center pole unit of the speaker block is misaligned, set the stopper to the correct position with tweezers.

Center pole unit of the speaker block



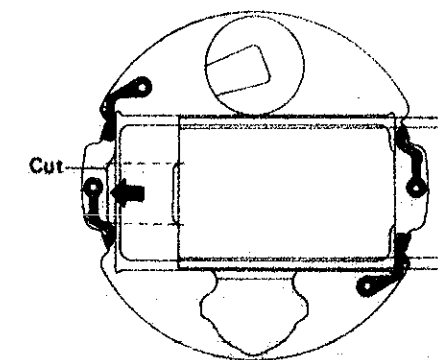
- When holding and lifting up the protrusion of the center pole unit of the speaker block with tweezers, it is possible that only the center pole unit of the speaker is removed. In this case, reassemble the speaker block so that dust can not enter and be careful not to break the coil.

⑦ ⑧ Connectors (A) and (B)



- After setting the reflecting mirror, set the connectors (A) and (B) as shown in the illustration. (Make sure that reflecting mirror is set securely.)


⑩ Liquid crystal panel



- Set the liquid crystal panel in the liquid crystal panel frame so that its seal is placed in the arrow marked position.

CLEANING

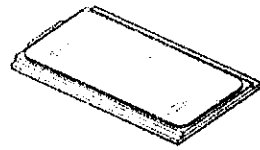
1. How to clean

Name of parts	Cleaning	Drying	Solution	Remarks
Connector 	Rinse or wash with a soft brush	Warm air.	Alcohol	<ul style="list-style-type: none"> ● Never use benzene or trichloroethylene as these will melt the connector. ● Do not set a connector until it is completely dry.
Plastic parts Liquid crystal panel and speaker frame	Rinse or wash with a soft brush	Warm air.	Benzene or alcohol	
Others Battery connection ⊕, speaker block fixing spring, speaker block lead terminal, switch lead terminals A and B	Rinse or wash with a soft brush.	Warm or hot air.	Benzene, trichloroethylene or alcohol	

2. Parts that must not be cleaned



Circuit block



Liquid crystal panel



Reflecting mirror



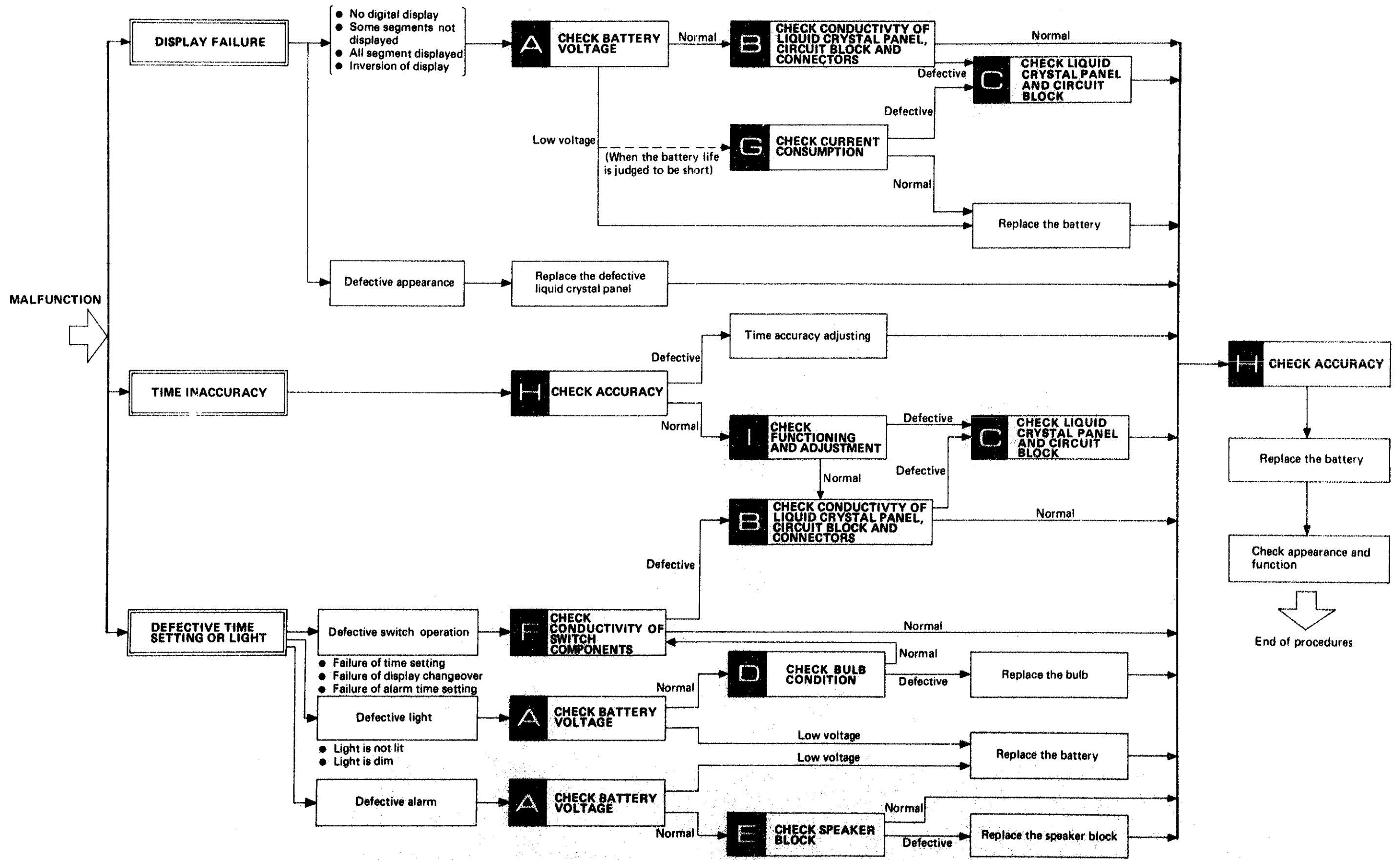
Center pole unit speaker block

- Only the conductive portions should be wiped with a cloth moistened with benzene or alcohol and dried with warm air. (Wipe the battery with a dry cloth.)
- Wipe off any dust or lint with a soft brush.

IV. CHECKING AND ADJUSTMENT

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

(1) Guide table for checking and adjustment



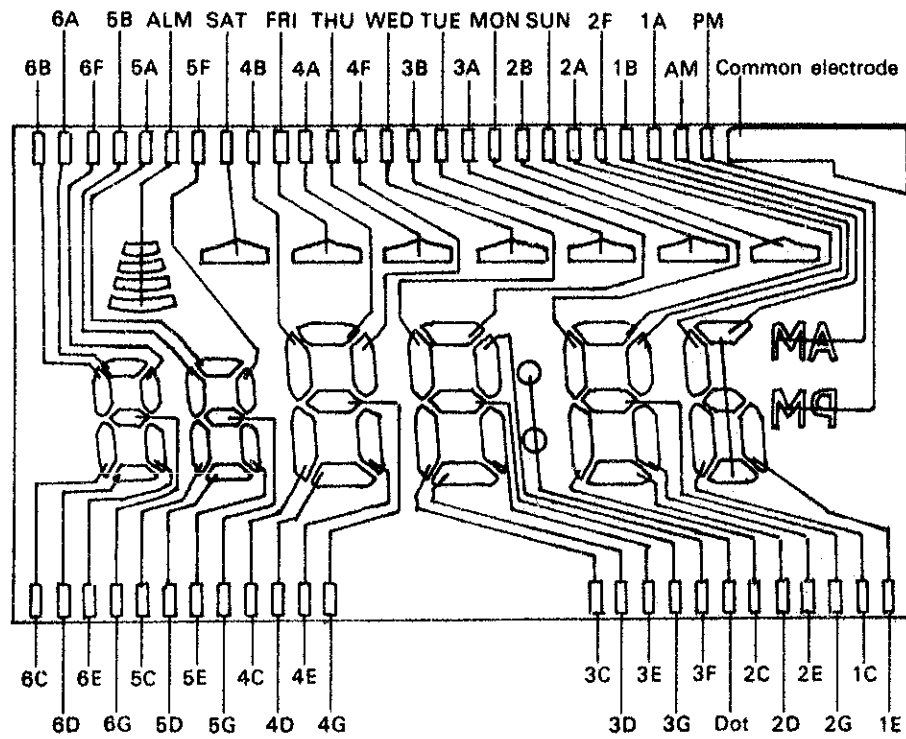
2. LIQUID CRYSTAL PANEL SEGMENT ELECTRODE

● Relationship between the segment and the C-MOS-LSI output terminal

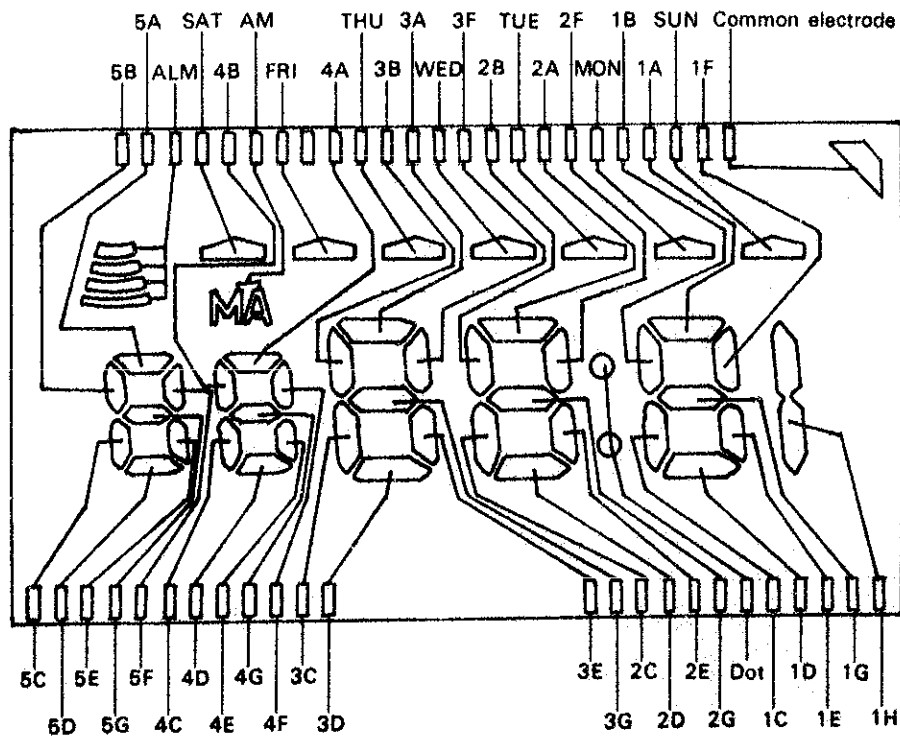
The liquid crystal panel electrode is connected electrically with each segment which forms a digital figure as shown in the illustration of the panel pattern below. (The panel pattern can be seen if the panel is slightly tilted and looked at in an angular position.)

Also, the liquid crystal panel electrode is connected electrically with the C-MOS-LSI output terminal by the connector.

Y446A



Y456A

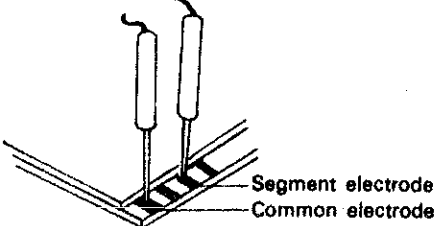
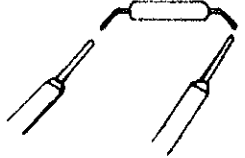
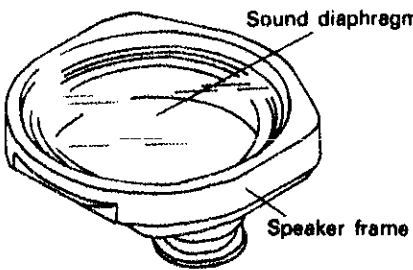


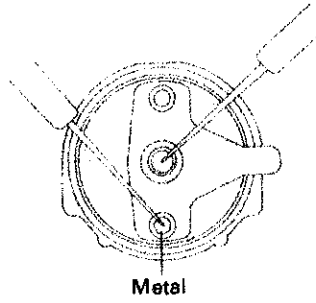
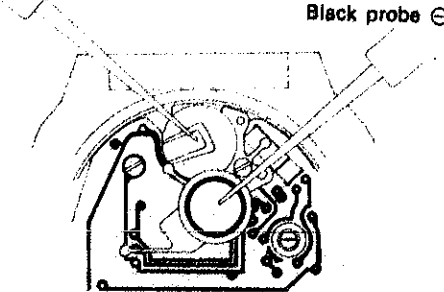
Note:

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

3. Procedures for checking and adjustment

	Procedure	Result and repair
CHECK THE BATTERY VOLTAGE	<p>Check the battery voltage</p> <ol style="list-style-type: none"> Set up the Volt-ohm-meter. Range to be used: DC 3V Measuring <ul style="list-style-type: none"> Probe Red (+) ... Battery surface (+) Probe Black (-) ... Battery surface (-) <p>Note: When handling the battery, use non metallic tweezers or fingertip.</p>	<p>Specified values:</p> <p>More than 1.5V Normal</p> <p>Less than 1.5V Defective</p>
CHECK THE CONDUCTIVITY OF THE LIQUID CRYSTAL PANEL, CIRCUIT BLOCK AND CONNECTORS	<p>Check the conductivity of the liquid crystal panel, circuit block and connectors</p>	<ul style="list-style-type: none"> Check for any dust, lint and other contamination, any scratches cracks and breaks on the connecting portions and check screw tightness. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Circuit block</p> </div> <div style="text-align: center;"> <p>Connector</p> <p>Breaks and scratches Dust, lint</p> </div> <div style="text-align: center;"> <p>Liquid crystal panel electrode</p> <p>Glass defect</p> </div> </div>
CHECK THE LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK	<p>Check the liquid crystal panel and circuit block</p> <p>Portions to which power should be supplied</p>	<ul style="list-style-type: none"> Check to see if the liquid crystal panel and the circuit block function correctly. <p>(1) Check the output voltage of the circuit block.</p> <p>Specified values:</p> <p>More than 0.8V Normal</p> <p>Less than 0.8V Defective</p> <p>Replace the circuit block with a new one and check to see if it functions correctly.</p>

	Procedure	Result and repair
CHECK THE LIQUID CRYSTAL PANEL AND CIRCUIT BLOCK		<p>(2) Check the liquid crystal panel. Set up the Volt-ohm-meter range to be used: OHMS R × 1 (Any range will do if more than 3V is applied to the terminal of the Volt-ohm-meter) Result: Lights up Normal Does not light up or more than two segments light up Defective Replace the liquid crystal panel with a new one.</p> 
CHECK BULB CONDITION	<p>Check bulb condition</p>  <p>Check to see if there is a broken filament in the bulb.</p> <ol style="list-style-type: none"> Set up the Volt-ohm-meter. Range to be used: OHMS R × 1 Measuring Apply the two probes of the Volt-ohm-meter to the bulb lead terminal as shown in the illustration. 	<p>Bulb lights up: Normal Bulb does not light up: Defective Replace the liquid crystal panel frame.</p>
CHECK THE SPEAKER BLOCK	<p>Check the speaker block</p> <p>(1) Check to see if the speaker sounds the alarm correctly.</p> <p>(2) Check for any dust and scratches on the sound diaphragm of the speaker block.</p>  <p>(Check for any dust and scratches on the sound diaphragm.)</p> <ul style="list-style-type: none"> Check for any dust, lint or contamination inside the speaker block or for deformation of the sound diaphragm. The sound diaphragm is fixed to the speaker frame and cannot be removed. 	<p>Speaker sounds: Normal Set the alarm time and if the alarm does not operate at the required time, proceed to Replace the circuit block. Speaker does not sound or it sounds but not clear: Defective Proceed to 2.</p> <p>No dust or scratches: Normal Proceed to 3.</p> <p>Dust: Defective Wipe off any foreign matter lightly with a cloth moistened with cleaning solution.</p> <p>Scratched: Defective Replace speaker block.</p>

	Procedure	Result and repair
CHECK THE SPEAKER BLOCK	<p>(3) Check for any broken coil wire and short-circuit of the coil of the speaker block.</p> <ol style="list-style-type: none"> Set up the Volt-ohm-meter. Range to be used: OHMS R × 1 Measuring  <p>Apply the probes of the Volt-ohm-meter to the lead terminal of the speaker block.</p>	<p>Resistance: 120Ω ~ 140Ω: Normal Less than 120Ω (short-circuit) or More than 140Ω (broken coil wire) Defective Replace speaker block</p>
CHECK CONDUCTIVITY OF SWITCH COMPONENTS	<p>Check conductivity of switch components Check to see if the switch spring functions correctly.</p> <p>(1) Check to see if the switch springs function correctly when they are pushed in.</p> <ol style="list-style-type: none"> Check to see if the four 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. Check for dust, lint and other contamination on the contacting portions. 	<p>Functions correctly: Normal Does not function correctly: Defective If the switch springs do not function correctly after the switch springs are set correctly, replace the switch springs with new ones.</p> <p>No dust, lint or uncontaminated: Normal Dust, lint or contaminated: Defective Wipe off any foreign matter.</p>
CHECK CURRENT CONSUMPTION	<p>Check current consumption Check to see if the current consumption is normal. (Can be checked regardless of which function the watch may be performing.)</p> <ul style="list-style-type: none"> Volt-ohm-meter Range to be used: DC 12 μA or DC 0.03 mA* <p>Red probe ⊕</p> <p>Black probe ⊖</p> 	<p>*Note: If the pointer of the Volt-ohm-meter swings over the maximum value when DC12 μA or DC0.03 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 portions. Then, after two or three seconds, return the range to DC12 μA or DC0.03 mA again for measuring.</p> <p>Less than 4.3 μA: Normal Replace the battery with a new one. More than 4.3 μA: Defective Proceed to 2.</p>

	Procedure	Result and repair
CHECK ACCURACY	Check accuracy Check gain and loss of time. 1. Set up the Quartz Tester. As there are several types of Quartz Testers, refer to the respective instruction manual. 2. Measuring	If the watch tends to gain or lose, proceed to <u>Time accuracy adjusting.</u> Time accuracy is adjusted by turning the trimmer condenser.
CHECK FUNCTIONING AND ADJUSTMENT	Check functioning and adjustment	Functioning... Check that the time display, calendar display, and alarm display modes change and function correctly. Adjustment... Check that button operation and adjustment correspond correctly in all adjusting functions.

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

V. PARTS LIST OF MODULE

Cal. Y446A			
PART NO.	PART NAME	PART NO.	PART NAME
4001 150	Circuit block		
4242 150	Switch lead terminal A		
4242 151	Switch lead terminal B		
4242 152	Speaker block lead terminal		
4256 150	Speaker block fixing spring		
4270 150	Battery connection (-)		
4271 150	Battery connection (+)		
4313 025	Connector A		
4313 028	Connector B		
4398 151	Liquid crystal panel frame		
4398 155	Speaker frame		
4510 311	Liquid crystal panel		
4521 150	Reflecting mirror		
4530 010	Bulb		
4580 155	Speaker block		
4991 231	Speaker gasket		
012 304	Circuit block screw		
017 198	Tube for circuit block screw		
★ Maxell SR41W SEIZAIKEN TR41W	Silver oxide battery		