TECHNICAL INFORMATION

CITIZEN QUARTZ

Cal. No. D031

CITIZEN

■1. OUTLINE

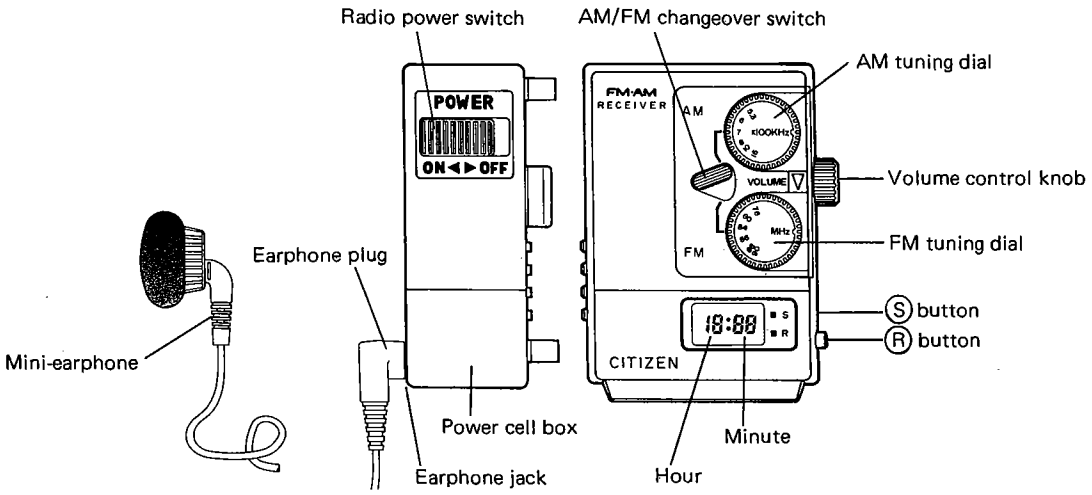
This caliber, featuring AM and FM radio functions, is the digital watch with a novel disign.
The watch section operates separately from the radio section.
The radio section is made of a sheet of the substrate of the circuit, employing the power source which is placed in a separate system of the power cell box.

■2. SPECIFICATIONS

Watch section	Caliber No.	D031
	Type	Digital quartz watch with radio
	Movement size (mm)	10.0 x 17.0 x 4.4 t (Inc. power cell part)
	Accuracy	±30 sec./month at normal temperatures
	Oscillation	32,768Hz
	Display method	FE-twist type nematic LC (Liquid Crystal) display
	Integrated circuit	C/MOS-LSI (1 unit)
	Effective temp. range	0°C ~ 55°C
	Adjustment of time rate	Adjustment is impossible due to the fixed condenser
	Measurement of time rate	2 seconds
	Display functions	Normal time — Hour, minute Calendar — Month, date Second — Second
	Additional functions	Fully automatic calendar (February ends on the 28th) Automatic return
	Power cell (Silver oxide power cell)	Parts No. : 280-341 (1 unit) Cell code : SR621SW Size : 6.8φ x 2.1 t mm Voltage : 1.55V Capacity : 15mA Lifetime : About 2 years
Radio section	Reception frequency	AM : 535 ~ 1605 KHz FM : 88 ~ 108 MHz
	Antenna	AM : Ferrite antenna FM : Earphone cord antenna
	Reception method	AM : Straight method FM : Super heterodyne method
	Volume control	VR-type non-stage method
	Tuning dial	Respective methods for AM and FM
	Semiconductor	IC (2 units) Transistor (2 units)
	Operational temp. range	0°C ~ 60°C
	Earphone	Mini-earphone type Impedance : 170Ω Plug diameter : 2.5φ mm
	Power cell	Parts No. : 280-904 (3 units) Cell code : LR44 Size : 11.6φ x 5.3 t mm Voltage : 1.5V Capacity : 105mAH Lifetime : AM — About 55 hours FM — About 10 hours
	Power cell box	Size : 16 x 42.5 x 10 t mm Accessories : Earphone jack Switch function

■3. HANDLING INSTRUCTIONS

3-1. Nomenclature



3-2. Operation procedure of the radio

(1) Attach the power cell box to the watchcase.
(2) Insert the earphone plug into the earphone jack.
(3) Turn the power switch ON that is provided on the upper side of the power cell box.
(4) Set the AM/FM changeover switch to the desired broadcasting.
(5) Select a station which you like, by frequency using the tuning dial.
(6) Adjust volume with the volume control knob.

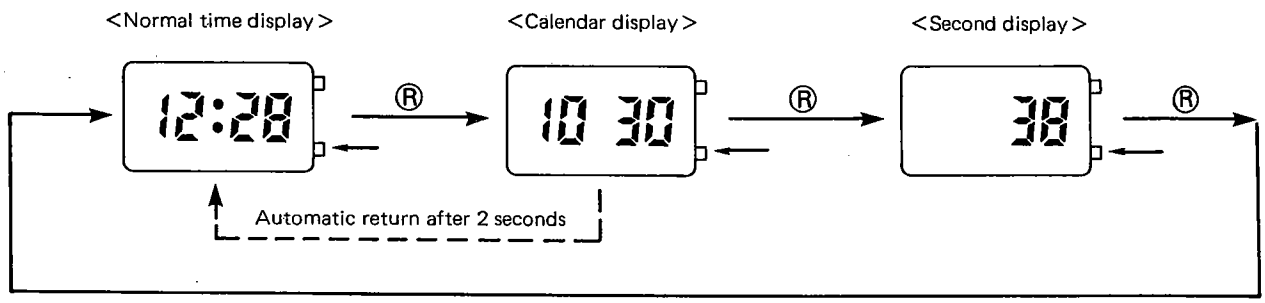
<Notes on operation>

- When listening to the FM radio, extend the cord of mini-earphone. The cord serves as an antenna.
- On the vehicles or in the buildings, electric wave becomes weak, and thus you may find hard to listen to the radio. The closer you go to the window, the more clearly you can listen to the radio.
- If the radio is not in use, either remove the power cell box or turn the power switch OFF.

3-3. Operation procedure of the watch

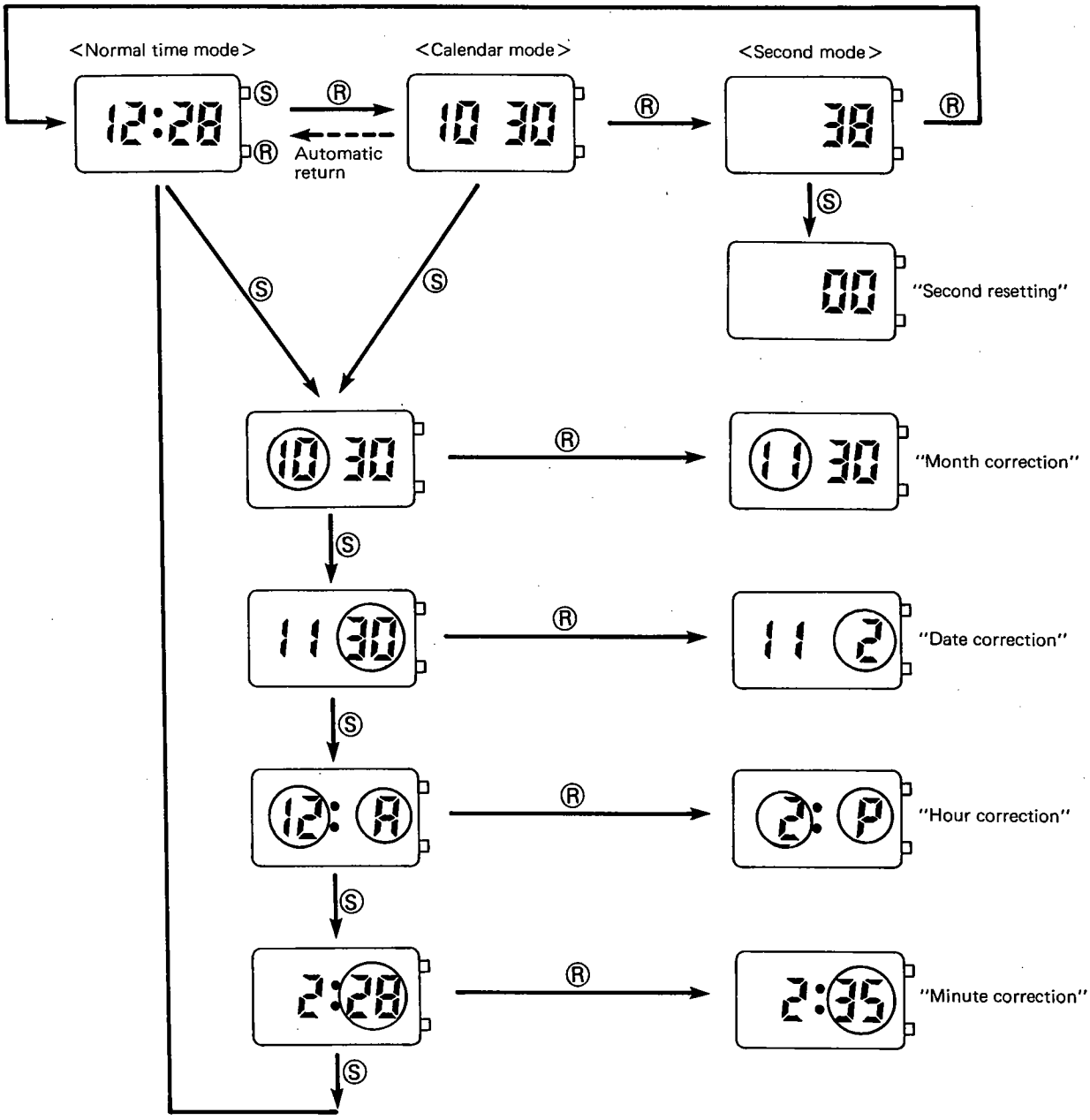
(a) Switchover of modes

- The display modes change with each push of the Ⓡ button in the order of normal time, calendar and second.
- The normal time display automatically returns in approx. 2 seconds, replacing the calendar display.



(b) Correction of hour and calendar

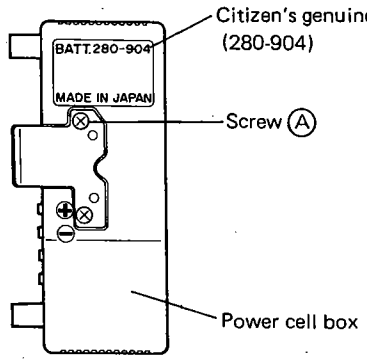
1. If the Ⓢ button is pushed in the second mode, the second display will be reset to "00". In such cases, if a push of the Ⓢ button is made when the second display indicates more than 30, the minute display will increase by one minute.
2. If the Ⓢ button is pushed in the normal time mode or calendar mode, the month correction mode will be obtained.
3. If the Ⓢ button is repeatedly pushed, such correction modes as "date", "hour" and "minute" will be obtained.
4. Date, hour or minute will be corrected with a push of the Ⓡ button in the respective correction modes.
5. Letters "A/P" are displayed in the hour correction mode. Reset to either A or P at this time.
6. The correction mode is identified with a flash of the corresponding display (circled in the diagram below). The second display, however, will not flash.



■4. REGARDING REPLACING POWER CELL

The radio is driven by three power cell units mounted in the power cell box, and the watch, by one power cell unit inside the watchcase. Thus, the watch keeps running without problems, even if the power cells for the radio are removed.

<How to replace the power cells for the radio>



(Back side view of the power cell box)

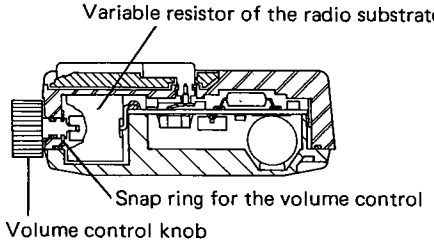
* Use Citizen's genuine power cells (280-904) for replacements.

(1) Unfasten the screw Ⓐ provided on the back side of the power cell box.
(2) Take off the lid of the power cell box.
(3) Replace the power cells with new ones. Three units of power cells have to be replaced at the same time. Mount the new ones with ⊕ facing up after cleaning the power cell surface.
(4) Put the lid back on the power cell box and fasten the screw Ⓐ. Thus, replacement is finished.

■5. NOTES ON DISASSEMBLY & ASSEMBLY OF MOVEMENT

<Radio section>

(1) Removal of the radio substrate

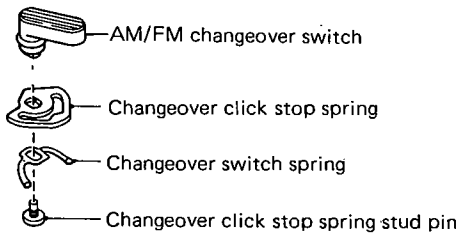


The pointed end of the volume control knob has been engaged with the variable resistor of the radio substrate, as shown in the illustration to the left.

Therefore, take off the snap ring for the volume control first and remove the volume control knob.

Then, the radio substrate can be removed.

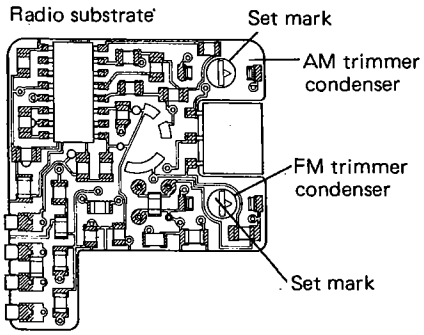
(2) Handling of the AM/FM changeover switch, changeover click stop spring and changeover switch spring

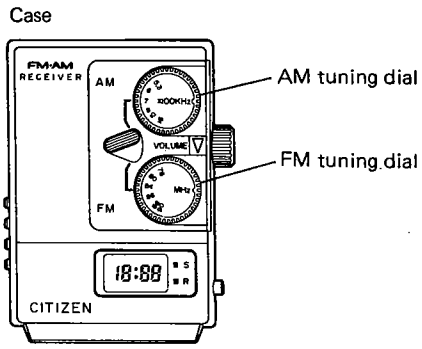


The AM/FM changeover switch provided on the upper side of the case as well as the changeover click stop spring and changeover switch spring which are provided inside the case are all fixed by the changeover click stop spring stud pin. The stud pin has been firmly pressed into the AM/FM changeover switch. Remove the stud pin by prying it up with the screwdriver. Pushing it in enables the mounting.

Positioning of the AM/FM changeover switch, changeover click stop spring and changeover switch spring is made by adjusting their own Ⓓ holes.

(3) The radio substrate and AM/FM tuning dial

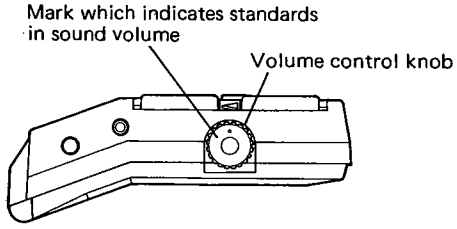


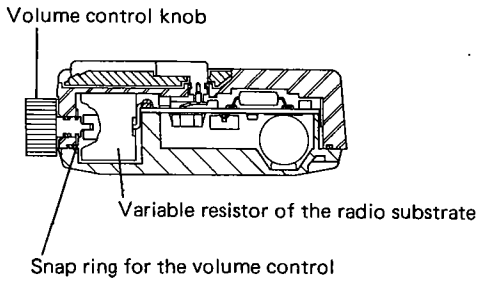


If the radio substrate is attached to the case at random, there will be a difference between the frequency of the tuning dial and that of the radio substrate. Proper mounting procedure of the radio substrate will be explained below:

1) Setting the radio substrate;
   A set mark has been provided in a position (trimmer condenser) where the pointed end of the tuning dial should be engaged with the radio substrate. Set the set mark at the left side, as shown in the illustration to the left, with both AM and FM trimmer condensers.
   Note) The trimmer condenser can be turned both clockwise and counterclockwise.
2) Setting the tuning dial;
   As shown in the illustration to the left, turn the AM and FM tuning dials clockwise until they stop.
3) Setting the radio substrate and case;
   Insert the radio substrate into the case. Engage the pointed end of the tuning dial with the trimmer condenser of the radio substrate by slightly moving the tuning dial left and right.

(4) Mounting of the volume control knob





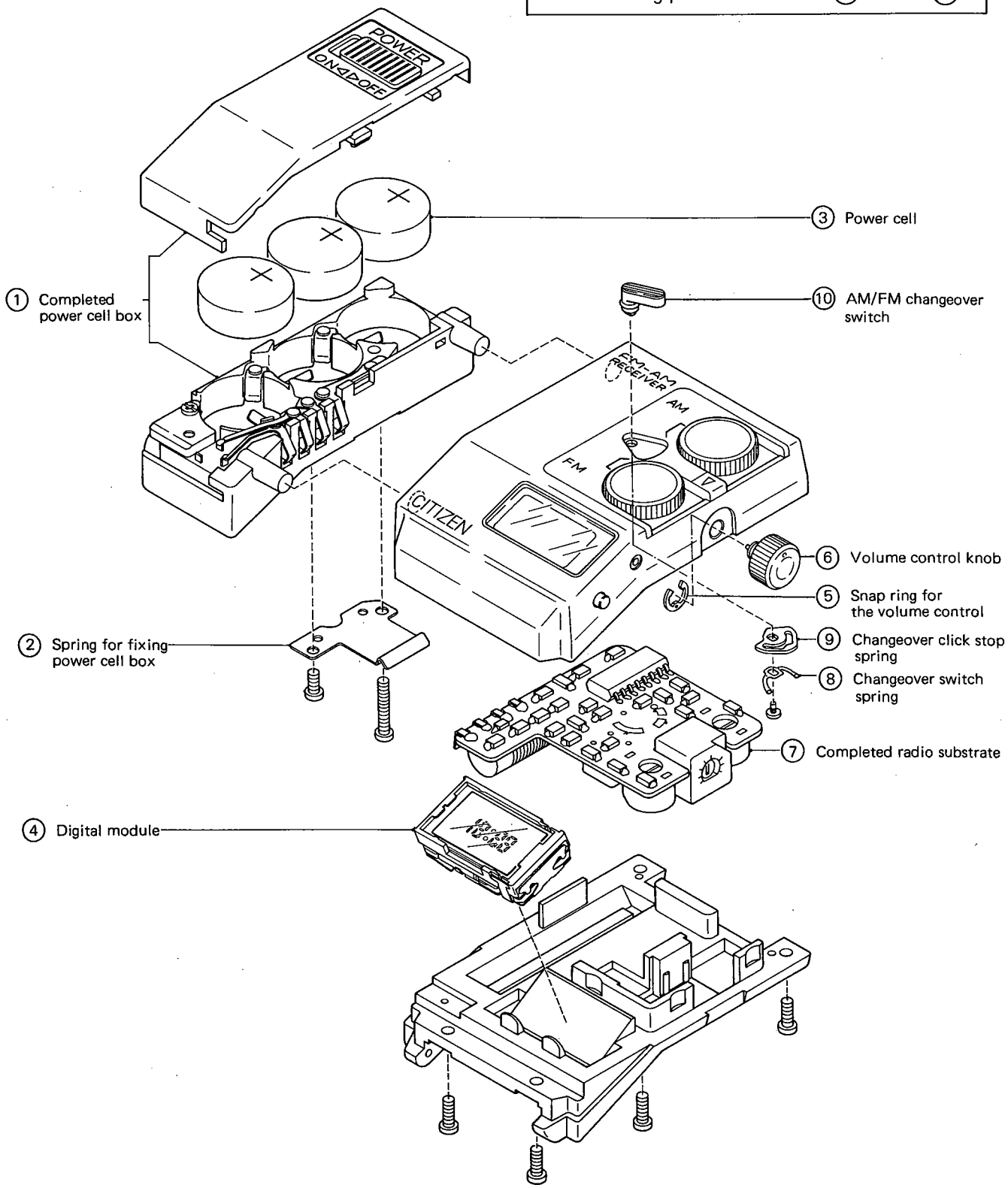
The volume control knob has a mark which indicates standards in sound volume. Set the volume control knob in accordance with the following procedure:

1) Lightly turn the variable resistor of the radio substrate counterclockwise using the screwdriver until it stops, where the sound volume is at its minimum.
2) Put the radio substrate in the case so that the mark provided on the volume control knob will come to upper left, as shown in the illustration to the left.
3) Fix the volume control knob with the snap ring for the volume control.

■6. DISASSEMBLY & ASSEMBLY OF MOVEMENT

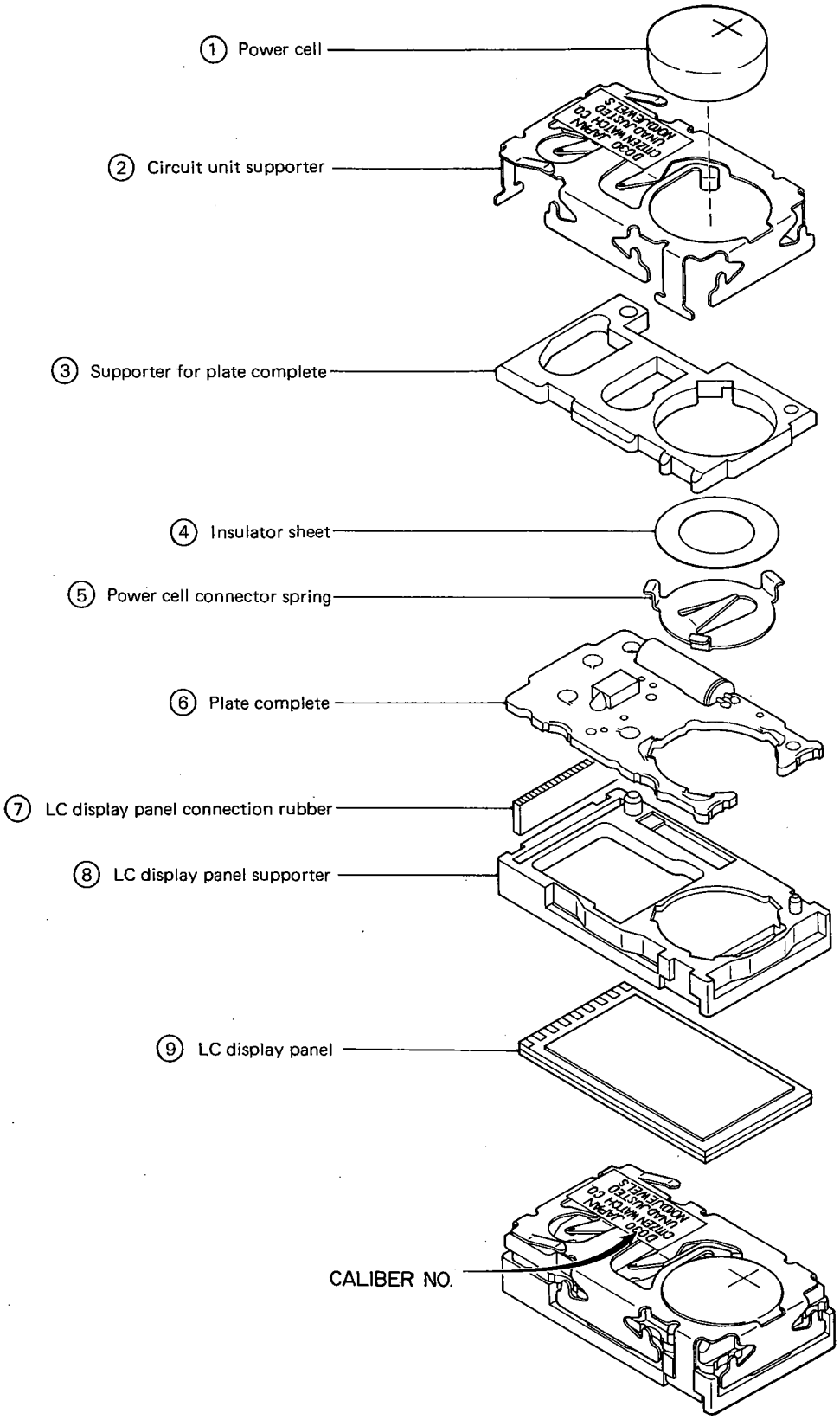
<Radio section>

Disassembling procedure :	①	~	⑩
Assembling procedure :	⑩	~	①

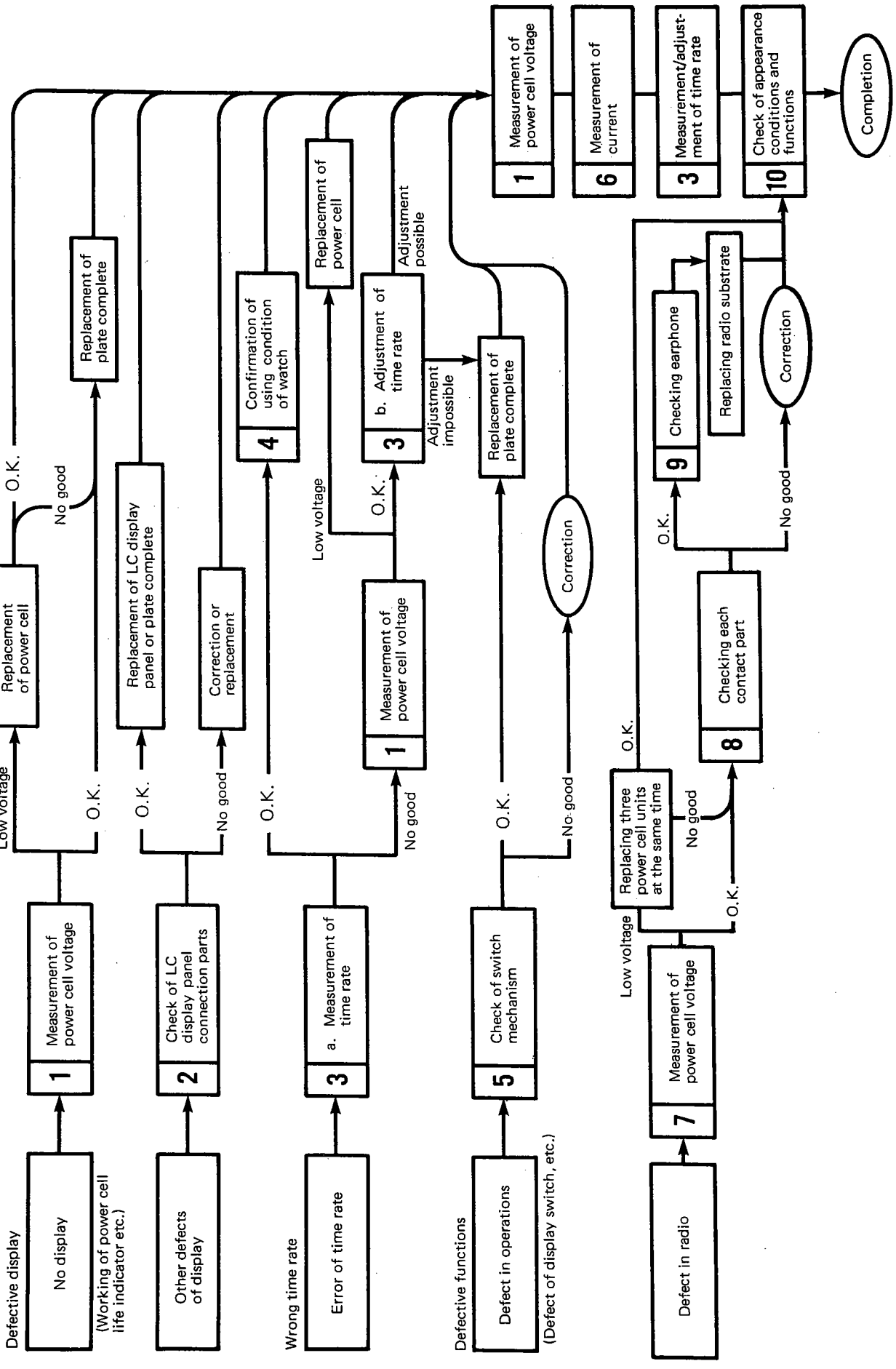


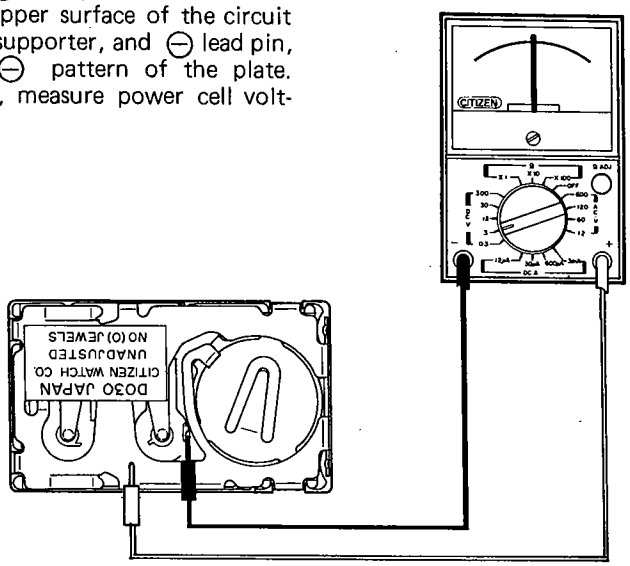
<Digital section>

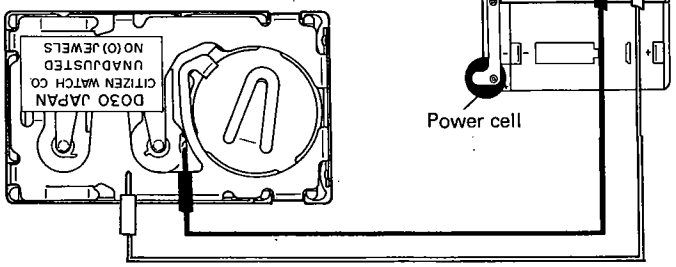
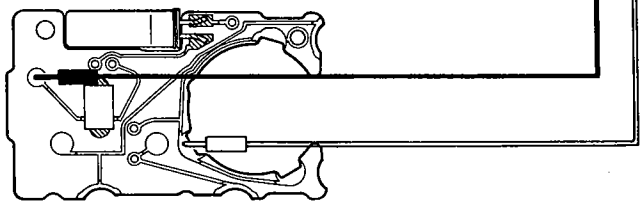
Disassembling procedure :	①	~	⑨
Assembling procedure :	⑨	~	①

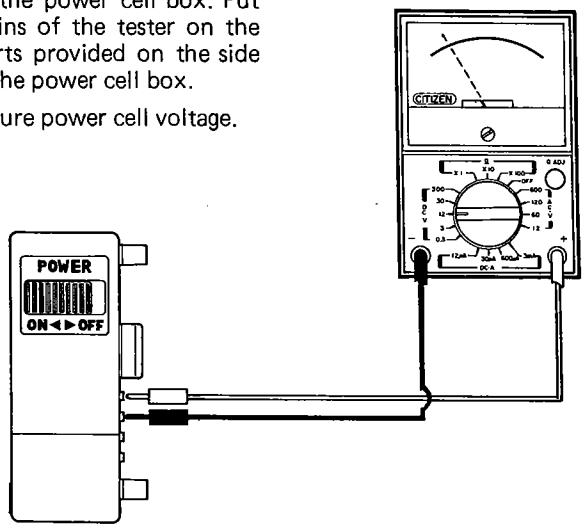
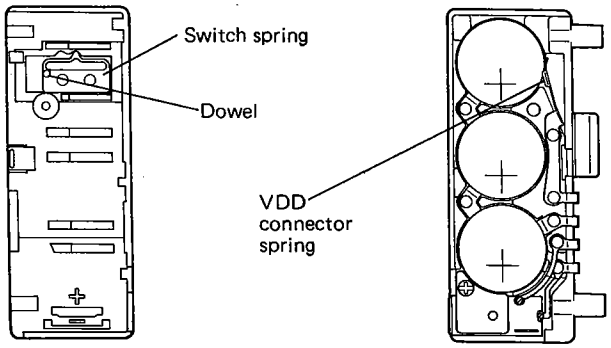
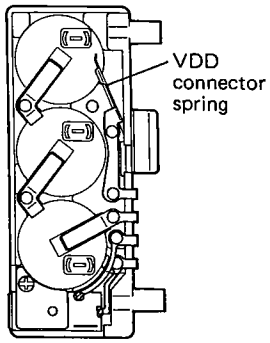


■7. TROUBLESHOOTING & ADJUSTMENT OF MOVEMENT

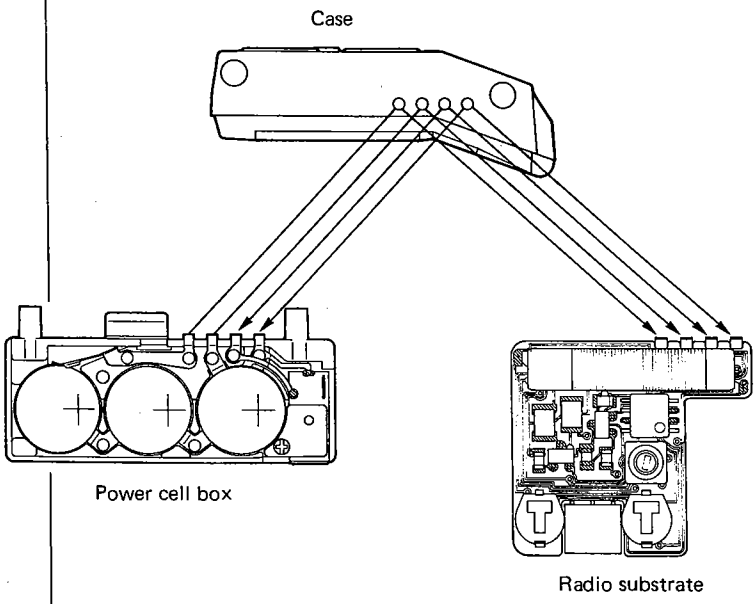


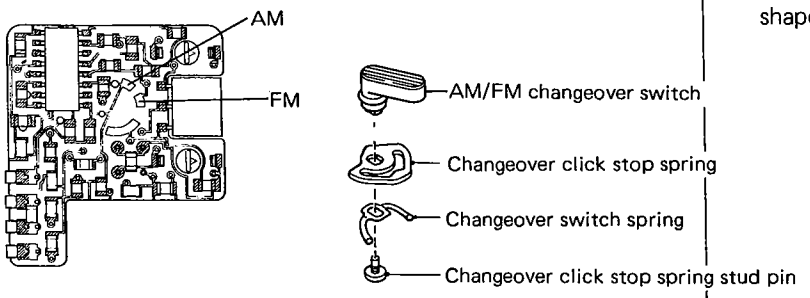
Checking items	How to check	Result and treatment
1 Checking power cell voltage	Put ⊕ lead pin of the tester on the upper surface of the circuit unit supporter, and ⊖ lead pin, on ⊖ pattern of the plate. Then, measure power cell voltage. <Tester range: D.C. 3V> 	**Over 1.5V** → Nondefective **Under 1.5V** → Replace the power cell
2 Checking connection parts of LC display panel	Checking the LC display panel, the LC display panel connection rubber and the plate complete for conductivity; (1) Make sure that the LC display panel, the LC display panel connection rubber and the plate complete have been properly mounted. (2) Check that there is no dust, dirt, cuts, cracks or scratches on each conductive part (between the pattern of the plate and the LC display panel connection rubber and also between the LC display panel connection rubber and the LC display panel).	Bad mounting → Mount again Dust or dirt → Remove it Cuts, cracks, scratches or warp → Replace the defective part with a new one
3 Measurement and adjustment of time rate	(1) Measurement of time rate: Make a measurement of time rate with the "MEASURE TIME" set at a range of 2 seconds. (2) Adjustment of time rate: Adjustment is impossible because the condenser has been fixed.	If there is a big shift in time rate, replace the plate complete.
4 Confirming using conditions	Make sure in which environment the customers use this watch checking the following points. ●Whether they handle it properly or not ●Whether they use it beyond the effective temp. range ●How long it has been since they set the watch	

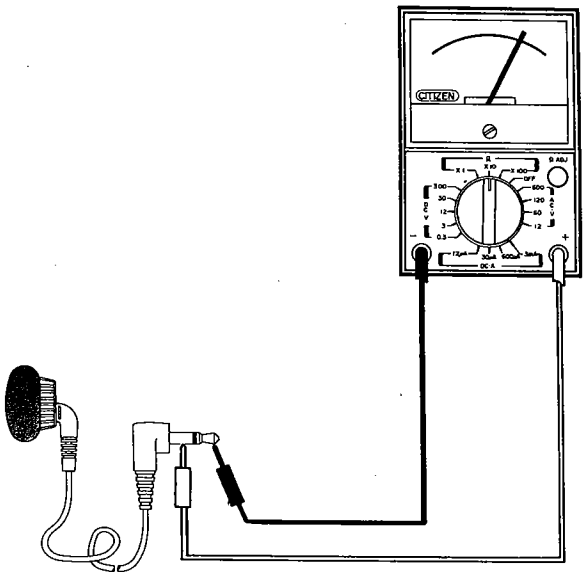
Checking items	How to check	Result and treatment
5 Checking switch mechanism	Check to see which has problems, the push buttons or the movement. First, check the movement separately. (1) Checking the movement; ●Push the switch part of the circuit unit supporter with the tweezers and bring it into contact with the pattern of the plate complete to confirm the switch function. ●Confirm that the plate complete has not peeled off and also confirm the switch part of the circuit unit supporter for any problem. (2) Checking the push buttons; ●Check that the push buttons attached on the case have not been deformed or soiled. Note) Be sure to apply silicon oil to the packing of the push buttons to maintain water-resistance and smooth operation of the buttons.	The switch function is available. → Check the push buttons The switch function is not available → Remove dust or dirt from each contact part The pattern has peeled off → Replace the plate complete The switch part has been deformed → Return it to its former proper shape
6 Measurement of current	(1) Measuring current consumed by the entire watch; As shown in the illustration, put ⊖ lead pin of the tester on the upper surface of the power cell connector spring, and ⊕ lead pin on the upper surface of the circuit unit supporter. Then, measure current consumed by the entire watch. <Tester range: D.C. 12μA>  (2) Measuring the plate complete separately for current; Put ⊕ and ⊖ lead pins of the tester on ⊕ and ⊖ patterns of the plate complete, respectively to measure current. 	<Current value of the completed module> ●**Under 1.3μA** → Nondefective ●**Over 1.3μA** → Measure the plate complete separately for current <Current value of the plate complete alone> ●**Under 1.1μA** → The plate complete is nondefective. Mount the LC display panel again. Current value is still over 1.3μA after mounting the LC display panel again. → Replace either the LC display panel connection rubber or the LC display panel. ●**Over 1.1μA** → Replace the plate complete.

Checking items	How to check	Result and treatment
7 Measurement of power cell voltage of radio section	Set the power switch to the ON side which is provided on the upper surface of the power cell box. Put the lead pins of the tester on the contact parts provided on the side surface of the power cell box. Then, measure power cell voltage. <Tester range: D.C. 12V> 	**●Over 4V** → Nondefective **●Under 4V** → Measure the power cells singly for voltage. <Measuring the power cells singly for voltage> **●Over 1.5V with each of three units of power cells** → Check the switch **●Under 1.5V with any of the three** → Replace the three all at once
8 Checking each contact part	(1) Checking the switch of the power cell box;  On the back surface of the power switch is the switch spring which functions in combination with the power switch. A dowel projects on the left side of this spring. If the switch spring moves left and right, the dowel touches the VDD connector spring, which is either in contact or not in contact with the plus side of the power cell. In short, if the power switch is turned ON, the dowel on the switch spring separates from the VDD connector spring, thus producing conductivity. ●In case the completed power cell box cannot generate more than 4V (while the switch is ON), though each of the power cells is over 1.5V, check the following points. *If there is no dust or dirt on the contact part between each power cell and the spring. *If the VDD connector spring properly touches the plus side of the power cell.	 Dust or dirt → Remove it The spring has been deformed. → Return it to its former proper shape. Any problem except those mentioned above → Replace the completed power cell box.

Checking items	How to check	Result and treatment
	●In case the power supply still continues even after the power switch has been turned OFF; *The dowel of the switch spring is in poor contact with the VDD connector spring. (2) Checking the contact parts of the power cell box, the case and the radio substrate;	●The VDD connector spring has been deformed. → Return it to its former proper shape. ●If there is any problem except the above-mentioned. → Replace the completed power cell box.
	The power source (4.5V) in the power cell box has to be applied to the radio substrate properly. In addition, sound signals have to be transmitted from the radio substrate to the earphone jack of the power cell box. *Make sure that each contact part has no dust or dirt on it. *Make sure that the spring of each contact part is in good contact with the corresponding part and also make sure that the spring has not been deformed. (3) The AM/FM changeover switch spring and the radio substrate	●Dust or dirt → Remove it ●The spring has been deformed. → Return it to its former proper shape.
	Changeover between the AM and FM broadcasting is made by the changeover switch spring and the AM/FM pattern of the radio substrate. Check the following points;	





Checking items	How to check	Result and treatment
	*Whether the AM/FM changeover switch, the changeover click stop spring and the changeover switch spring properly operate in unity with each other. *Whether there is no dust or dirt on each contact part. *Whether the changeover switch spring has not been deformed.	Bad mounting → Mount again Dust or dirt → Remove it The spring has been deformed. → Return it to its former proper shape.
9 Checking earphone	Put the lead pins on the earphone plug, as shown in the illustration. Then, measure the earphone for impedance. <Tester range: 1 x Ω> 	130 Ω ~ 200 Ω → Nondefective
10 Checking appearance and functions	(1) Radio section ●Check that the radio section can receive all electric waves of AM/FM broadcasting that have been emitted by the radio stations in the corresponding area. ●Check that sound volume can be controlled by turning the volume control knob. (2) Watch section Checking the following points; ●Whether there is no dust or dirt inside the case. ●Whether all the segments have been provided. ●Whether there is no problem with the switching functions and with each correction initiated by the operation of the push buttons.	Volume control is impossible. → Replace the radio substrate.

CITIZEN WATCH CO., LTD.

Tokyo, Japan

Printed in Japan
CTZ-8502