TECHNICAL GUIDE
AND
PARTS LIST

CAL. Y591A

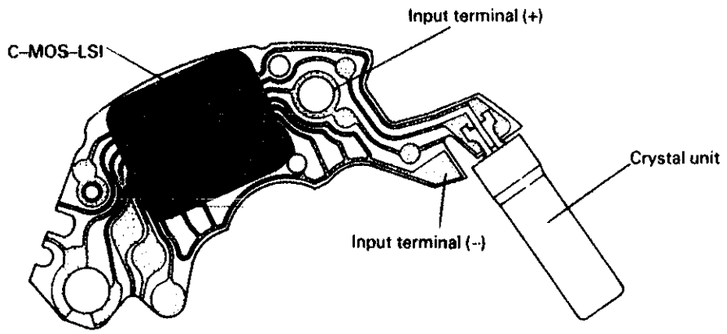
ANALOGUE QUARTZ

CONTENTS

I. SPECIFICATIONS

Item \ Cal. No.	Y591A
Indication system	Three hands
Additional mechanism	Second setting device Electric circuit reset switch
Loss/gain	Loss/gain at normal temperature range Monthly rate: Less than 20 seconds
Maximum diameter	13.0 (3H – 9H) x 15.55 mm (6H – 12H)
Casing diameter	13.0 x 15.15 mm
Height	2.5 mm (2.9 mm including battery)
Regulation system	None
Measuring gate	10-second
Battery	Maxell SR527SW Battery life: Approx. 2 years Voltage: 1.55V
Jewels	5 jewels

II. CIRCUIT BLOCK SCHEMATIC



III. LIST OF SCREWS USED

Only one type of screw is commonly used in Y591A watch.

Part No. 022241

Train wheel bridge screw 1
Battery connection (+) screw 1
Circuit block cover screw 3

IV. STEP MOTOR COMPENSATION DRIVING PULSE SYSTEM

(Special motor drive circuit with a low current consumption)

- With the former quartz circuit, the pulse width supplied from the electric circuit to step motor is contact (Fig.1).

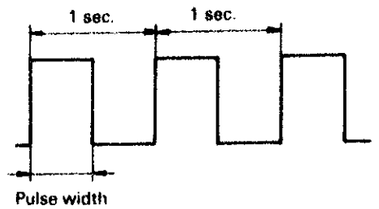


Fig. 1

- In Cal. Y591A, the drive pulse width changes according to the load required to drive the step motor. In the normal conditions, the circuit supplies the minimum power to drive the hands. If the extra load is applied (to drive calendar, or at a low ambient temperature), an enough pulse is supplied to overcome the load (Fig. 2).

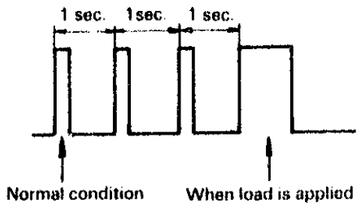


Fig. 2

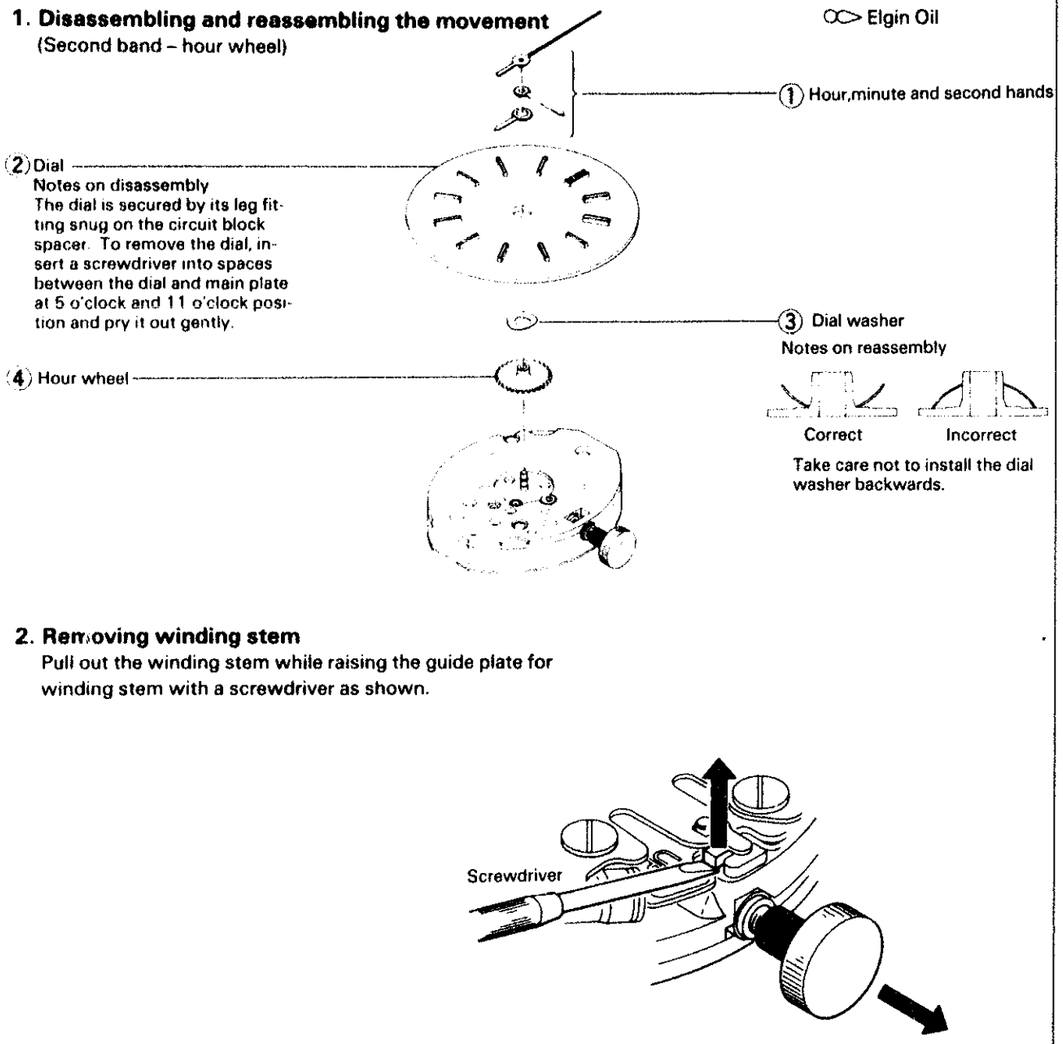
- As the minimum pulse width is required to drive the step rotor in normal conditions, the minimum power consumption results.
(For checking the current consumption, refer to page 10.)

V. DISASSEMBLING, REASSEMBLING AND LUBRICATING

Disassembling procedures: Figs ① – ㉗
Reassembling procedures: Figs ㉗ – ①

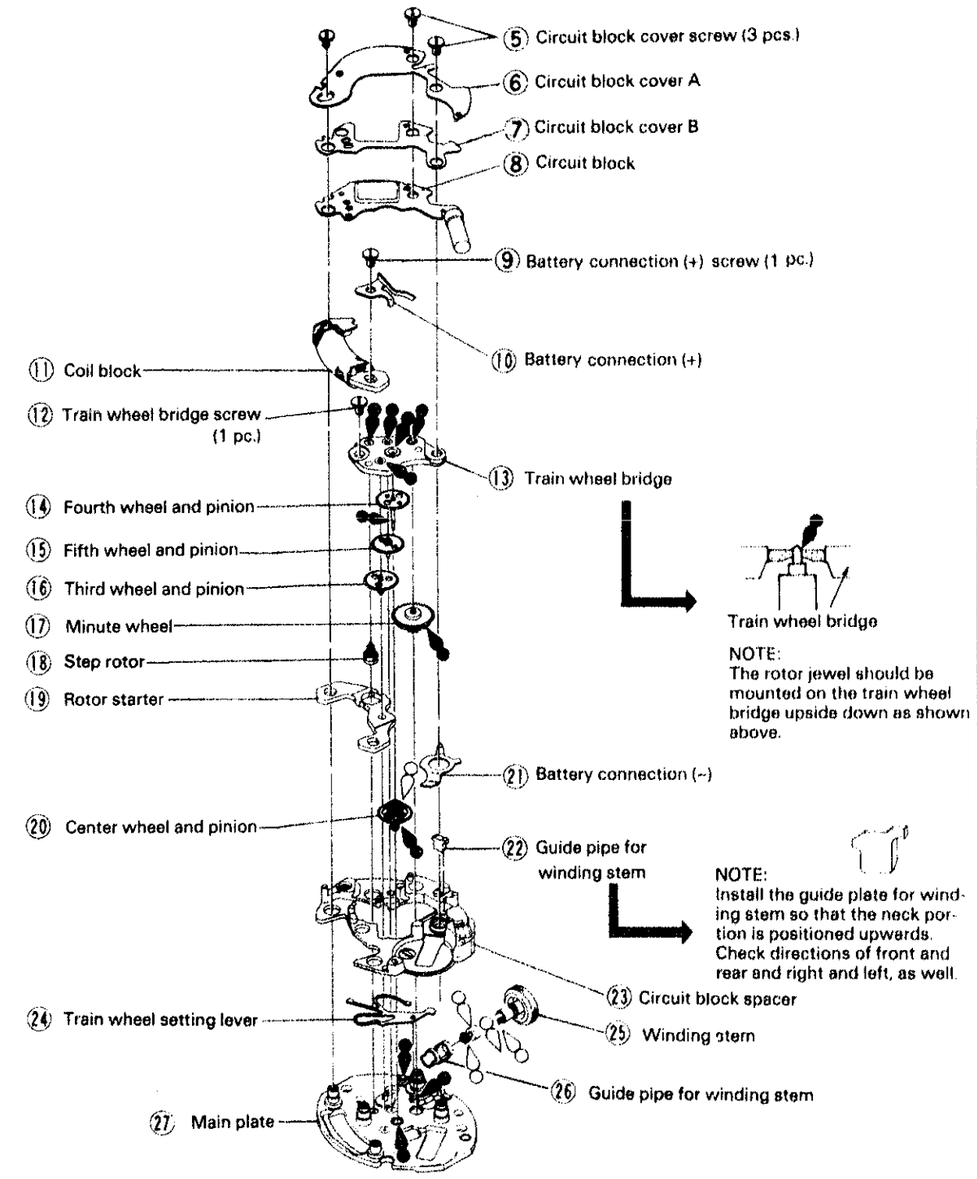
Lubrication:
●► Moebius A
○◁ Elgin Oil

1. Disassembling and reassembling the movement
(Second band – hour wheel)



2. Removing winding stem
Pull out the winding stem while raising the guide plate for winding stem with a screwdriver as shown.

3. Train wheel bridge, coil block and circuit block



VI. CLEANING

(1) How to clean

Name of parts	Cleaning	Drying	Cleaning solution	Remarks
Step rotor Plastic parts (circuit block spacer)	Rinse or scrub with a soft brush	Warm air drying	Benzene, alcohol	● Use a clean solution as the step rotor is magnetized. Any foreign matter which cannot be removed by cleaning should be removed with rodico. ● When cleaning with benzene, the cleaning time should be minimized.
Others (excluding parts that must not be cleaned.)	Clean with the cleaner, rinse or gently scrub with a soft brush.	Warm or hot air drying	Benzene, trichloroenthylene, alcohol	

(2) Parts that must not be cleaned.

Circuit block

Coil bolck

Battery

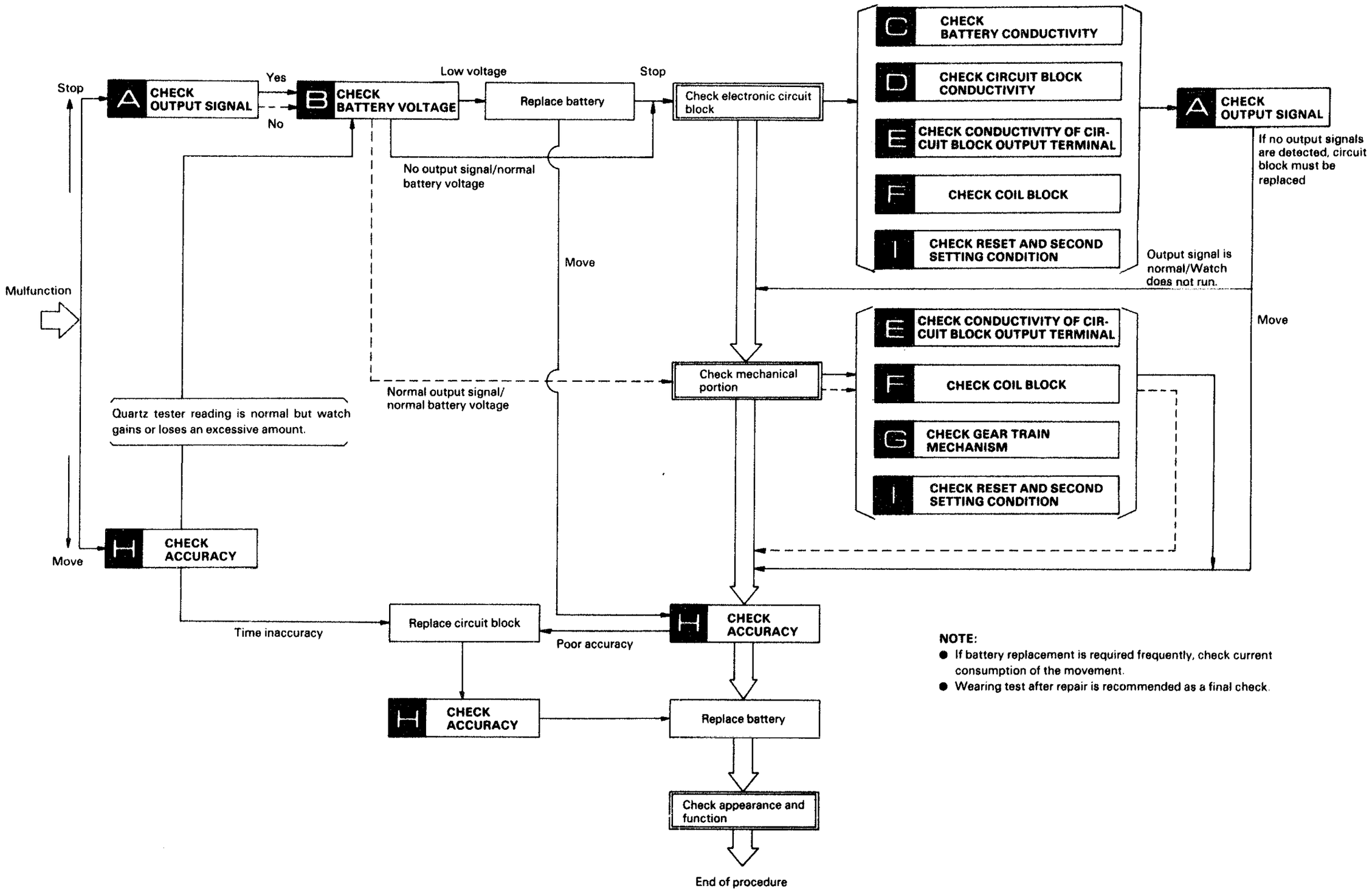
- Be sure to clean only stain on the conductive portions (circuit block, etc.) with a cloth moistened with benzene, or alcohol and dry them with warm air.

(3) Cleaning condition

- Be sure to clean the parts in a room that is well ventilated. Do not leave the washing tank of the cleaning solution uncapped for hours in a poorly ventilated room. The vapor of the cleaning solution is slightly toxic. Prolonged breathing of the vapor may induce drowsiness, provoke nausea, headache or make you feel dizzy.

VII. CHECKING AND ADJUSTMENT

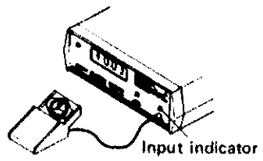
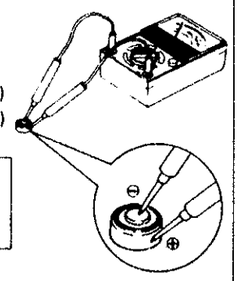
1. Guide table for checking and adjustment

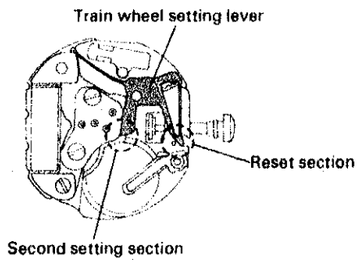
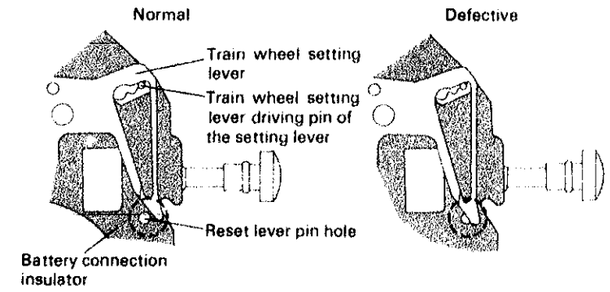
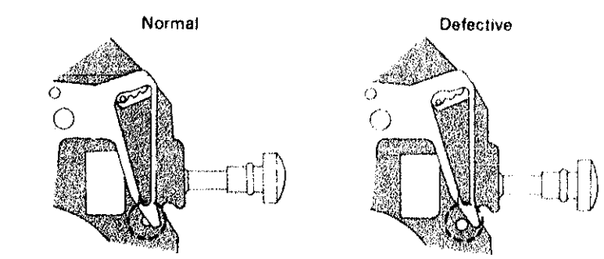


NOTE:

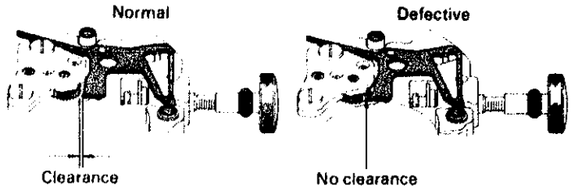
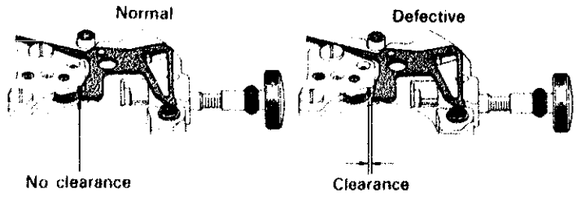
- If battery replacement is required frequently, check current consumption of the movement.
- Wearing test after repair is recommended as a final check.

2. Procedures for checking and adjustment

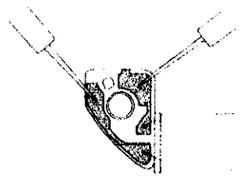
	Procedure	Result and repair
A CHECK OUTPUT SIGNAL	• Check for output signal of the watch by checking to see if the input indicator blinks. • This will determine whether the trouble is mechanical or electrical. (1) Set up the Quartz Tester. (2) Check for blinking input indicator.  **Note:** Check the output signal with the crown in the normal position.	One-second blinking: Normal No one-second blinking: Defective Check the battery voltage.
B CHECK BATTERY VOLTAGE	• Check battery voltage. (1) Set up the Volt-ohm-meter. Range to be used: DC3V (2) Measuring Red probe (+) ..... Battery surface (+) Black probe (−) .... Battery surface (−)  **Note:** When handling the battery, use plastic or bamboo tweezers or fingercots.	1.5V or more: Normal Less than 1.5V: Defective Replace the battery.
C CHECK BATTERY AND CIRCUIT BLOCK CONDUCTIVITY	• Check if the battery current flow to the circuit block is normal. • Check for short circuit and defective conductivity of the conductive portions of the circuit block. (1) Check the screws for tightness. (Circuit block screw, coil block screw, etc.) (2) Check for any contamination on battery surface and battery connection (−). Check for broken wire, short circuit, contamination and solder peeling off of the circuit block pattern.	No loose screws: Normal Loose screws: Defective Retighten the screws. Uncontaminated: Normal Contaminated: Defective Wipe off any foreign matter. Conductive: Normal Not conductive: Defective Wipe off any foreign matter. For other defects, replace the circuit block.

	Procedure	Result and repair
D CHECK RESET AND TRAIN WHEEL SETTING CONDITION	Check for normal reset and Train wheel setting condition. 1. Confirm that the second hand stops when the crown is at second click position and that the second hand starts moving 1 second after the crown is returned to the normal position. (Check with output signal or check with the second hand installed.)  	The second hand stops and starts moving after 1 second: Normal The second hand does not stop or move irregularly: Defective Check the Train wheel setting lever reset section and Train wheel setting section.
	2. Checking Train wheel setting lever reset section (Check when the circuit block is removed. Confirm that the Train wheel setting lever and battery connection insulator are not floated.) (1) With the crown at normal and first click position  	Whole the battery connection insulator reset lever pin hole can be observed: Normal A half of the hole is covered: Defective Check the Train wheel setting lever driving pin of setting lever for bending or lubricant. Replace the Train wheel setting lever.
	(2) With the crown at second click position  	A half of the reset lever pin hole is covered. Normal Whole the hole can be observed: Defective Check the Train wheel setting lever driving pin of setting lever for bending or lubricant. Replace the Train wheel setting lever.

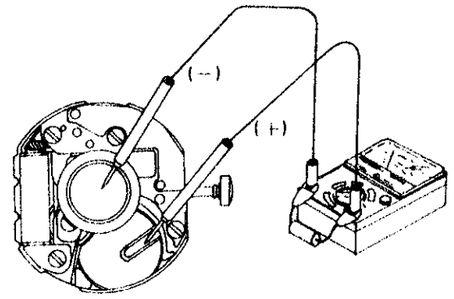
D CHECK RESET AND TRAIN WHEEL SETTING CONDITION

Procedure	Result and repair
3. Checking Train wheel setting lever setting section (Check when the circuit block is removed. Confirm that the Train wheel setting lever and battery connection insulator are not floated.) (1) With the crown at normal and first click position.  	Clearance between fourth wheel and pinion and Train wheel setting lever: Normal No clearance between fourth wheel and pinion and Train wheel setting lever: Defective Check the Train wheel setting lever driving pin of setting lever for bending or lubricant. Replace the Train wheel setting lever.
(2) With the crown at second click position  	No clearance: Normal Clearance: Defective Check the Train wheel setting lever driving pin of the setting lever for bending or lubricant. Replace the Train wheel setting lever.

E CHECK COIL BLOCK

Procedure	Result and repair
● Check the coil block for broken wire or short circuit. (1) Set up the Volt-ohm-meter. Range to be used: OHMS × 100 Always calibrate the Volt-ohm-meter. (2) Checking Apply the two probes of the Volt-ohm-meter to the two lead terminals of the coil block. Any probe will do. 	2.0 kΩ ~ 3.0 kΩ: Normal Less than 2.0 kΩ: Defective (Short circuit) more than 3.0 kΩ: Defective (broken wire) Replace the coil block.

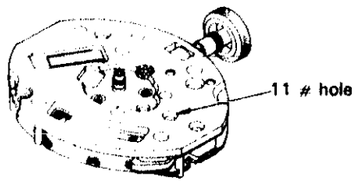
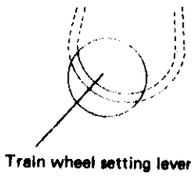
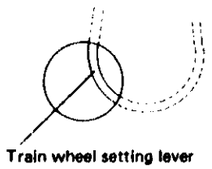
F CHECK CURRENT CONSUMPTION

Procedure	Result and repair
● Check for normal current consumption. (1) Set up the Volt-ohm-meter. Range to be used: DC12 μA (2) Attach 200 ~ 500 μF condenser kit to the Volt-ohm-meter. (3) Place the battery with its (+) surface facing downward. (4) Apply two probes of the Volt-ohm-meter to the battery surface and battery connection (−). Red probe (+) ..... Battery connection (−) Black probe (−) .... Battery surface (−) (5) Read the Volt-ohm-meter.  	Less than 1.3 μA: Normal 1.3 μA or more: Defective

G CHECK ACCURACY

Procedure	Result and repair
● Check gain and loss of time. (1) Set the Quartz tester measuring gate to 10 second. (Any gate of some 10 seconds will do.) (2) Always use electromagnetic microphone. Do not use the ultrasonic microphone which measures the crystal oscillation. If the ultrasonic microphone is used, the measured value is false. ● The above condition should be satisfied, as the Y643 uses the logical regulation system, which compensates the time by controlling the dividing ratio of the IC dividing by 16 steps according to the crystal oscillation. ● As the trimmer condenser is not used, replace the circuit block if the watch loses or gains excessively.	Does not lose or gain: Normal Lose or gain: Defective Replace the circuit block. (Loss or gain of this watch is less than 20 seconds/month.)

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

	Procedures	Result and repair
1 CHECK RESET AND SECOND SETTING CONDITION	Check the reset and second setting condition. 1. Pull the crown out and confirm that the second hand stops. Push in the crown to the normal position and confirm that the second hand starts again after 1 second. (Check with the input indicator of the Quartz Tester or with the second hand installed.) 2. Check the function of the train wheel setting lever through the 11 # hole in the main plate. Check the position of the train wheel setting lever when the crown is fully pulled and pushed in to the normal position.  Back surface of the main plate ● With the crown at normal position  Train wheel setting lever ● With the crown at pulled out position  Train wheel setting lever	Starts after 1 second: Normal Does not stop: Defective Proceed to 2 Functions correctly: Normal Does not function correctly: Defective Replace the train wheel setting lever
	3. Pull the crown out and check the Quartz Tester output signal.	Output signal: Normal No output signal: Defective Replace the circuit block.

PARTS LIST for Cal. Y591

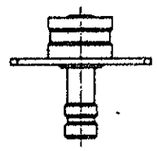
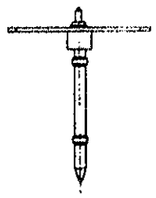
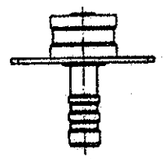
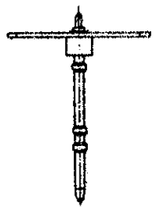
PART NO.	PART NAME
125 715	Train wheel bridge
★221 706	Center wheel & pinion
★221 716	Center wheel & pinion
231 715	Third wheel & pinion
★241 705	Fourth wheel & pinion
★241 715	Fourth wheel & pinion
238 715	Guide pipe for winding stem
261 705	Minute wheel
★271 706	Hour wheel
★271 715	Hour wheel
354 705	Winding stem
391 716	Train wheel setting lever
491 589	Dial washer
701 715	Fifth wheel & pinion
711 715	Guide plate for winding stem
4001 707	Circuit block
4002 715	Coil block
4146 715	Step rotor
4239 715	Rotor stator
4270 715	Battery connection (–)
4271 717	Battery connection (+)
4408 707	Circuit block spacer

PART NO.	PART NAME
4457 706	Circuit block cover A
4457 719	Circuit block cover B
022 241	Train wheel bridge screw
022 241	Battery connection (+) screw
022 241	Circuit block cover screw
011 325	Upper hole jewel for fourth wheel
011 542	Upper hole jewel for third wheel
011 542	Upper hole jewel for fifth wheel
011 547	Lower hole jewel for step rotor
011 568	Upper hole jewel for step rotor
023 330	Guide pin for circuit block cover A
027 122	Tube for train wheel bridge
027 122	Tube for circuit block cover screw A
027 123	Tube for circuit block cover screw B
027 124	Tube for regulating switch lever screw
027 125	Tube for battery connection (+) screw
027 721	Train wheel setting lever adjusting pin
027 722	Hooking pin for train wheel setting lever
027 723	Banking pin for train wheel setting lever
027 724	Reset pin
• Maxell SR527SW	Battery
• SEIZAIKEN	

TR527SW

Remarks:

★ Center wheel & pinion , Fourth wheel & pinion, Hour wheel
There are two different types as specified below.
Combination:

TYPE	Center wheel & pinion	Fourth wheel & pinion	Hour wheel
a	221 716 	241 715 	271 715 
* b	221 706 	241 705 	271 706 

* As of this printing the Type b combination is not used.
However it may be employed in the future with certain case designs.