SERVICE MANUAL & PARTS LIST (without price)

REF. NO. S/M-242
APRIL 1987

MODULE NO.

QW-661
OPERATION CHART: MODULE QW-661

Reading the display

[Regular timekeeping mode]
- Time
- [Countdown alarm]
- [Countdown alarm period indicator]
- [Time]
- Press [A] to set [Time]
- Release [B]

[Calendar]
- Press [C]
- Release [D]

Countdown alarm operation

Countdown period indicator

Countdown can be set from 1 minute to 30 minutes. To set
- Countdown period, press [A] as many times as required.

Setting countdown period


Countdown alarm when [B] is released. When countdown
reaches zero, beeper sounds for 30 seconds. Press any
button to stop beeper.

Daily alarm operation

- Beep sounds for 20 seconds at preset time every day until cleared when daily alarm is
- Press any button to stop beeper. Signal sound every hour if time signal
- is set.

Sound demonstration
- Press and hold [B] in alarm mode to sound beeper.

[Setting daily alarm]
- change.
- 3) Auto-retrieve function
- Display automatically returns to initial daily alarm mode display if no button is pressed
- for 1 to 2 minutes.
- 4) Press [D] to complete.

[On or off setting of daily alarm and time signal]

- Daily alarm and time signal sound.
- Press [E]
- Daily alarm and time signal do not sound.
- Press [F]
- Daily alarm only sound.
- Press [G]
- Time signal only sound.
- Press [H]

Stopwatch operation

Mode indicator

- 1/10 second
- Press [A]
- Time display
- Press [B]
- (Start)
- Press [C]
- (Stop)
- Press [D]
- (Reset)
- Press [E]

Using Transmitter

Antenna

- Tuning knob
- On
- Microphone
- Off
- Transmitter on/off switch

- Slowly turn tuning knob to position where noise on
- radio stops.
- 85 MHz
- High volume setting may cause handling sound.
- 148 MHz

Transmitter precautions:
- This product is not intended to be used to invade the privacy of others.
- Never attempt to increase the power of the transmitter by altering the internal circuitry
- or extending the antenna. Doing so may be violation of local laws governing the use of
- radio transmitters.
- Avoid frequencies used by commercial radio stations.
- The efficiency of the transmitter is reduced in low temperatures.
- The maximum communication distance is 60 meters under optimum conditions. The
- actual distance, however, is determined by surrounding conditions and the
- efficiency of the radio.
- Orient the antenna to find the best position for communication.
- Stable reception may be difficult to obtain when using radio which utilize headphones
- and earphone cords as antennas. For best results, use a high-sensitivity FM radio.

Transmitter applications:
- Sending a voice to a remote radio unit.
- Recording of conversation on a radio cassette recorder
- Using a radio as a wireless PA device.
- Intercommunication between motor vehicles over the FM radio.

Transmitter battery maintenance:
- Transmitter signal weakens when battery power decreases.
- Battery should then be replaced.
- 1) Using a coin, remove rear battery cover.
- 2) Replace battery.
- 3) Place ring on top of battery and screw on cover.
- 4) Ring process used for dust and humidity.

*Transmitter battery should be replaced periodically every 2 years.
Do not leave dead battery in unit to avoid malfunction caused by battery leakage.
*Remove battery when transmitter is not used for extended periods.
PART 1: WATCH BLOCK

1. CIRCUIT DIAGRAM

2. CHECKING TERMINALS AND COMPONENTS

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Detail</th>
<th>Item</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td>No. 365/SR1116W (28mAH, 1.55Vdc)</td>
<td>Accuracy</td>
<td>±30 sec./month</td>
</tr>
<tr>
<td>Battery life</td>
<td>Approx. 2 years</td>
<td>Accuracy setting system</td>
<td>Pad selection (G1~G3)</td>
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<tr>
<td>Current consumption</td>
<td>1.56μA maximum</td>
<td>Accuracy checking</td>
<td>See page 5</td>
</tr>
<tr>
<td>Alarm system</td>
<td>Piezo plate on back cover</td>
<td>Accuracy setting</td>
<td>+0.9 ~ −0.7 sec./day</td>
</tr>
</tbody>
</table>
5. PARTS LIST

Note: 1. Prices and specifications are subject to change without prior notice.
2. Spare parts are classified as follows according to their importance in after-sales service.
   - A Rank ................. Very Important
   - B Rank ................. Important
   - C Rank ................. Others
3. Our sales department supplies all batteries, so order batteries separately through Casio Sales Department.
4. As for order/supply of spare parts, refer to the separate publication "GUIDEBOOK for spare parts supply"

<table>
<thead>
<tr>
<th>Item</th>
<th>Code No.</th>
<th>Part Name</th>
<th>Spec. No.</th>
<th>Applicable Model</th>
<th>Q'ty</th>
<th>Unit Price N.R. Yen ($)(FOB: JAPAN)</th>
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<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>LCD</td>
<td>C506-01</td>
<td>QW-661C02</td>
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<td></td>
<td>2</td>
<td>P.C.B. with LSI</td>
<td>MSM6087C-459</td>
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<td>1</td>
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<td></td>
<td>3</td>
<td>Transistor</td>
<td>2SC1622A</td>
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<tr>
<td></td>
<td>4</td>
<td>Chip capacitor</td>
<td>CM-21YV104P15V</td>
<td>&quot;</td>
<td>2 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Quartz oscillator</td>
<td>KF-26GT</td>
<td>&quot;</td>
<td>1 (5 )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Coil</td>
<td>OL3.3 x 1.6DR-01</td>
<td>&quot;</td>
<td>1 (5 )</td>
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<tr>
<td>B or C Rank</td>
<td>7</td>
<td>Battery contact (−) 156</td>
<td>Q32496-1</td>
<td>QW-661C02</td>
<td>1 (20)</td>
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<td>9☆</td>
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<td></td>
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<td>Q22124-1</td>
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<tr>
<td></td>
<td>14</td>
<td>Housing 506-2</td>
<td>Q22125-1</td>
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<tr>
<td></td>
<td>15</td>
<td>Cushion 506B</td>
<td>Q49500</td>
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<td></td>
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<tr>
<td></td>
<td>16</td>
<td>Battery</td>
<td>No. 365 (SR1116W)</td>
<td>QW-661C02</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Note: ☆ = Newly employed parts
Q'ty = Quantity used per unit
* = Minimum order/supply quantity
6. AC (ALL CLEAR)

- Press the AC (All Clear) contact when inserting a new battery, or the memories and/or counters may give erratic displays.
- Touch the AC contact and the positive battery side (+) with metal tweezers.
- The touch should be made for about 2 seconds.

![AC contact image]

7. ACCURACY CHECKING

It is not possible to check the accuracy with the LCD sensor of a quartz timer unless the following operations are performed, because the internal display drive wavelength is 42.6 Hz.

To check the accuracy (by 32 Hz): Select the "ACCURACY CHECKING MODE".

The operations are shown below:

A) CHANGE TO THE "ACCURACY CHECKING MODE"

Push all the buttons (①, ②, and ③) at the same time for about 3 seconds.
All the segments will be displayed and the LCD drive signals will change from 42.6 Hz to 32 Hz. Then, check the accuracy with the LCD sensor of a quartz timer.

B) CANCELLATION OF THE "ACCURACY CHECKING MODE"

Push any button.
Then the display will return to the regular timekeeping mode.

Note: The "ACCURACY CHECKING MODE" will automatically return to the regular mode in 1 ~ 2 hour(s) without any operation.

![Accuracy checking mode image]
PART 2: TRANSMITTER BLOCK

1. SPECIFICATIONS

   A) TYPE: 3-transistor FM transmitter

   B) TRANSMISSION FREQUENCY: 88 MHz ~ 108 MHz

   C) MODULATION: Frequency modulation (FM)

   D) FIELD STRENGTH: Less than 15μV/m at a distance of 100 meters

   E) ANTENNA: 105mm overall length (77mm extended portion)

   F) TRANSMISSION RANGE: Approx. 60m in flat area, line-of-sight
      (Actual distance differs according to environmental and
      radio conditions.)

   G) BATTERY TYPE: No. 389/SR1130W (1.55V, 85mAH)

   H) BATTERY LIFE: Approx. 5 hours (continuous operation)

   I) CURRENT CONSUMPTION: 6mA ~ 8mA

2. REPAIR

   A precise adjustment and a fine tuning by a special instrument is always required when
   repairing the P.C.B. ass'y in the transmitter block.
   Therefore, in case a trouble occurs in the P.C.B. ass'y, replace the whole P.C.B. ass'y with
   a new one.
3. EXPLODED VIEW

*Battery cover

*Back seal rubber (for Battery cover)
16 [No. 389]

*Back cover ass’y

*Back seal rubber (for Back cover ass’y)

*Terminal plate 661-3

11 (6324 0443)

6 (7207 8470)

15 (7218 1000)

4 (7225 2133)

7 (7212 5829)

1 (7218 0926)

13 (7218 0926)

*Screw
(for Terminal plate 661-1)

9 (7212 6061)

8 (7212 5837)

3 (7225 2141)

12 (7218 0470)

2 (7105 0033)

*Packing ring

Set the microphone as in the figure.

*Screw
(for Front button ass’y)

*Contact switch

*Front button guide

*O-ring

*Water protect sheet

WATCH BLOCK ➡️ PAGE 3

10 (7212 6093)

5 (7201 9108)

*Crown button ass’y

*Push button ass’y (for Set)

*Push button ass’y (for Function)

*Case center sub ass’y with glass

*Front button ass’y

Set the crown button ass’y to be correctly joined with the trimmer capacitor on the P.C.B. ass’y.

NOTE: For components marked “*”, refer to the Parts List P/L-401.
4. PARTS LIST

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2. Spare parts are classified as follows according to their importance in after-sales service.
   
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<tr>
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</thead>
<tbody>
<tr>
<td>A</td>
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<tr>
<td>B</td>
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<tr>
<td>C</td>
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<th>Unit Price N.R. Yen (¥) (FOB: JAPAN)</th>
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<tbody>
<tr>
<td></td>
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<td>TRANSMITTER BLOCK OF MODULE</td>
<td>QW-661C02</td>
<td>TM-100</td>
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<td></td>
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<tr>
<td>A</td>
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<td></td>
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<tr>
<td>1 ×</td>
<td>7240 2134</td>
<td>P.C.B. ass'y</td>
<td>Q23164&quot;2</td>
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<tr>
<td>2 ×</td>
<td>7105 0033</td>
<td>Microphone</td>
<td>WM-82A</td>
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<td></td>
<td></td>
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<tr>
<td>B or C Rank</td>
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<td></td>
<td></td>
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<td>3 ×</td>
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<td>5 ×</td>
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<tr>
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<td>QW-661C02</td>
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</tr>
</tbody>
</table>

Note: × — Newly employed parts
      Q'ty — Quantity used per unit
      * — Minimum order/supply quantity
5. TRANSMITTER CHARACTERISTIC

A. Field strength and transmission range

What is meant by a field strength of 15 $\mu$V/m?

It is a value indicating the strength of a radio wave which is expressed by the voltage induced in a conductor of 1 meter long (unit length) placed in space. In other words, the value of 15 $\mu$V/m means that the voltage induced in a 1-meter-long conductor by a radio wave is 15 $\mu$V (15/1,000,000 of one volt).

Transmission range by a field strength of 15 $\mu$V/m?

A highly sensitive radio set is normally possible to receive an input of several dB for practical use. However, if the noise level in surroundings is high, reception will be almost impossible, unless the desired signal input level is considerably higher than the noise input level.

The relation between the desired signal and the noise levels is normally expressed as a signal-to-noise (S/N) ratio. In general, the S/N ratio needs to be more than 20 dB (that is, the signal strength is ten times the noise strength).

The field strength of 15 $\mu$V/m is equivalent to 23.5 dB.

The field strength measured at 23.5 dB is good enough for practical use in suburbs where the noise level is lower, but in urban or industrial areas where the noise level is higher, the S/N ratio becomes lower. It is, therefore, necessary to get near to the radio source in order to improve the S/N ratio.

○ Transmission range varies depending on radio set performance (sensitivity, etc.)
○ Transmission range varies depending on the noise level around the receiving station.
  (Normally, the noise level in urban areas is approximately 20 dB.)
○ When there are high-rise buildings or hills on the propagation path, the practical transmission range will be shorter.

B. Transmission range depending on surroundings

Since the field strength produced by the TM-100 is very feeble and the antenna is shorter for the radio wavelength in use, the transmission range may be affected by the conditions of surroundings.

Any conductive material located close to the TM-100 makes the radio field strength weak or strong. Such variations are closely related to the radio wavelength.

Radio field strength becomes weak in the following cases.

○ Communication between a room enclosed by metallic material (such as a ferroconcrete building) and the outside
○ Though the window is open, it is smaller for the radio wavelength.
○ Communication over obstacles such as fences
Radio field strength becomes strong in the following cases.
  - Field strength is induced around a conductive object near the TM-100.
  - Areas close to the water
  - The TM-100 is being operated at a high altitude.

C. Transmission techniques for the TM-100

The radio wave produced by the TM-100 is very weak, and the antenna is also so short that it can be retracted into the watch case. This means that it is far shorter than a conventional rod antenna.

The antenna is so designed that variations in the radio field strength will occur depending on the direction in which the person holding the TM-100 faces or the position of his wrist at which the TM-100 is worn.

Example: When the person holding the TM-100 turns his back toward the receiving station, reception will be better, since directivity is produced in the backward direction. Also, variations in the radio field strength will be caused by the height of the person holding the TM-100.
(When the holder bends forward, a similar result is obtained.)

Like other transmitters, the distance travelled by radio waves will differ according to the voice input level through a microphone.

If the voice input level is lower and the communication distance is longer, the articulation of speech will be reduced. When a microphone is positioned too close to the speaker's mouth, the sound will be distorted. Keep your mouth 5 to 8 cm off the microphone and speak in at the proper input level.

Note: Never attempt to increase the power of the transmitter by altering the internal circuitry or extending the antenna. Doing so may be violation of local laws governing the use of radio transmitters.

D. Receiving techniques by radio sets

To increase the transmission range without violating of local laws, radio set performance also needs to be improved.

  - Connect a high-performance antenna to the radio antenna.
  - Attach an FM receiving amplifier sold on the market.

By adjusting the direction of the receiving antenna, the best receiving effect can be obtained.