

FRONT COVER

vibrograf[®] M80

quartz generation



Information you should know about quartz watches.

The primary timekeeping element in a quartz watch is a precision machined piece of quartz that is mounted in a protective metal can. Most quartz crystals vibrate at 32,768 times a second.

The three basic types of quartz watches are:

LED Light Emitting Diode Display

LCD Liquid Crystal Display

ANALOGUE A stepper motor indexes a sweep second hand one time per second on a conventional analogue display.

Quartz watches are sensitive to aging, temperature and shock. A three foot drop on a hardwood floor will break most watches on the market today.

Many quartz watches are guaranteed by the manufacturer to give an accuracy within one minute a year. This corresponds to .17 seconds per day. Most watches can be regulated to attain this accuracy by adjusting a trimmer capacitor, once the case back is removed.

It is recommended that you refer to the technical literature supplied by the watch manufacturer when you attempt to regulate a particular quartz watch.

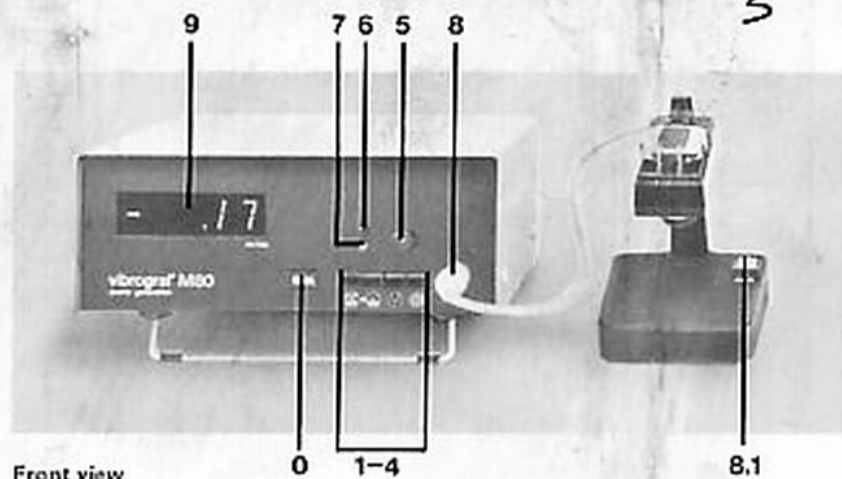
vibrograf® M80 "quartz generation".

General introduction

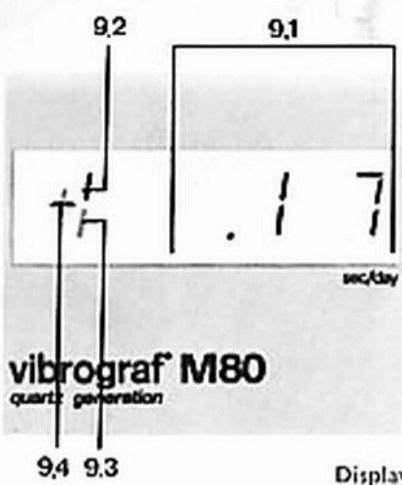
The Vibrograf M 80 is capable of testing all types of watches regardless of the watch manufacturer. The machine's unique microphone sensor unit will pick up LED, LCD, analogue stepper motor, tuning fork and balance wheel watches.

The latest state of the art integrated circuitry has been utilized to make the instrument compact and easy to operate. The watch's deviation in seconds per day is read on a bright, clearly readable LED (Light Emitting Diode) 16 MM high display. The machine's quartz crystal frequency standard is a highly stable device to insure maximum accuracy under varying conditions.

In short, the M 80 Quartz Vibrograf is the ultimate in watch testing equipment.



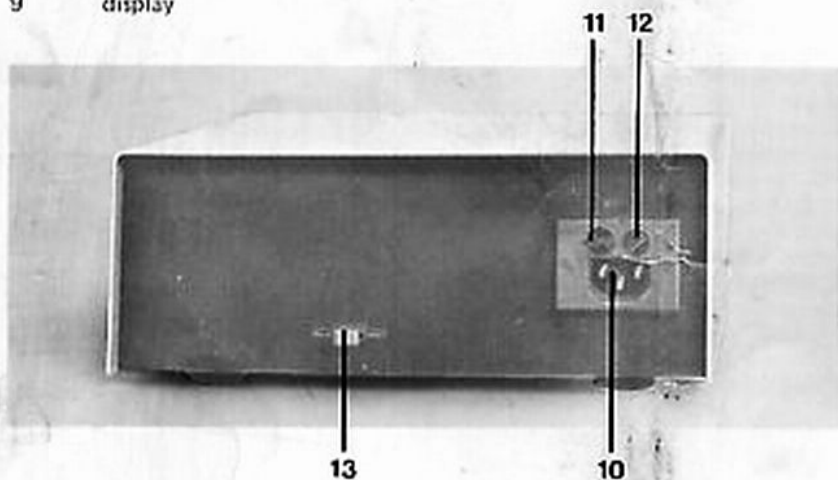
Front view



Display

- 0 mains on-off switch
- 1-4 buttons for selecting the type of movement
- 5 sensitivity control
- 6-7 pilot lamps indicating signal condition
- 8 input for pick-up and inductive sensor
- 8.1 change-over switch 32 K of pick-up
- 9 display

- 9.1 rate variation display
- 9.2 frequency of measurement indicator
- 9.3 "overflow" signal (measuring-capacity exceeded)
- 9.4 gain (+) or loss (-) signal



Rear view

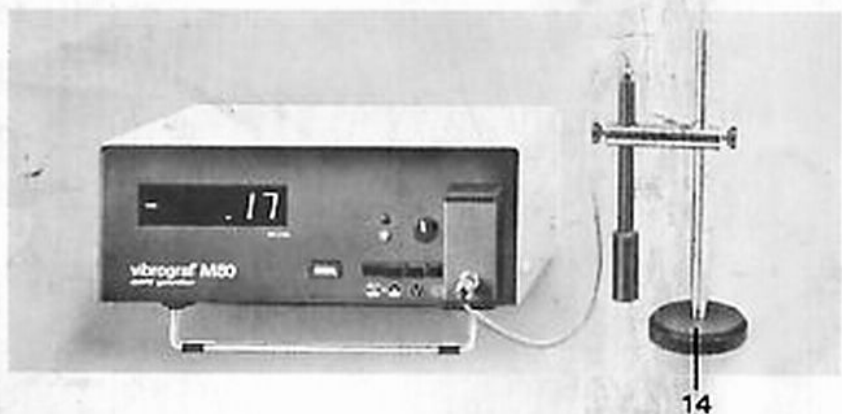
- 10 mains socket
- 11-12 fuses 125 mA for 220 V (250 mA for 110 V)
- 13 removable circuit board, duration of measurement 4 seconds

Putting the appliance into operation

- with the power cord provided, connect socket 10 to a properly grounded mains.
- Carefully connect the sensor plug into socket 8.

Optional

- 14 Inductive sensor for non-portable timepieces



14

1

Procedure for testing the different types of movements.

A few working principles.

1.1 Adjustment of sensitivity

Knob 5 is used for adjusting the sensitivity of the apparatus with reference to measurement pilot lamps 6 (red) and 7 (green):

Key 1

- pilot lamp 6 (red) will light up;
- increase the sensitivity, starting from the minimum level;
- as soon as pilot lamp 6 (red) goes out and pilot lamp 7 (green) lights up, measurement is effected correctly.

Keys 2 and 3

- set the sensitivity to the minimum;
- pilot lamp 7 (green) will light up or blink, and measurement will be effected correctly. If the lamp fails to light up, vary the position of the watch on the pick-up.

Key 4

- start from the minimum level;
- increase the sensitivity until the pilot lamp 7 (green) blinks regularly.

1.2 Correct measurement

The measurement is correct when the following conditions are fulfilled:

- the green lamp 7 is alight (or blinks regularly);
- the values displayed do not vary to any great extent;
- the "overflow" signal does not light up;
- the signal of measurement repetition (9.2) lights up at regular intervals (according to the measuring time).

1.3 Measuring time

The standard duration of measurement is 4 seconds. It might be different in a few rare special cases. Circuit boards for durations of 2 to 16 seconds can be obtained from the distributors. (Without circuit board, $T = 1$ sec.)

1.4 Position of the watch on the pick-up

The position of the watch on the pick-up, with the claws closed or open, depends on the type of movement.

Three positions are possible (they are indicated in detail for each case under "Procedure", see point 2):

- position for acoustic picking up (at the level of the quartz oscillator or of the escapement), claws closed;
- position for inductive picking up (at the level of the motor or of the tuning fork), claws open;
- position for capacitive picking up (at the level of the LCD or LED display) claws open.

In the last two cases, the watch can be shifted until the best position for picking up is found.

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Procedure.

- 2.1** Switch the apparatus on (key 0) and wait for 15 minutes to allow the time base to become stabilized

The apparatus may also be left switched on continuously, day and night, without any risk of damage.

- 2.2** Identify the type of watch or movement

Quartz-crystal watches with LCD or LED numerical display, and quartz-crystal watches with analogue display (hands): to be considered according to the frequency of the quartz:

- frequency of 32,768 Hz (95% of all quartz-crystal watches)
- frequency different from 32,768 Hz. Tuning-fork watches.

Mechanical watches or electric watches with motor balances.

- 2.3** Quartz-crystal watches with a frequency of 32,768 Hz

- Place the watch upon the pick-up, claws closed (acoustic picking up, at the level of the quartz oscillator), see fig. 2.3

- set the change-over switch B.1 of the pick-up to 32 K
- press key 1
- adjust the sensitivity (knob 5)
- read off the error of rate in hundredths of a second per day (± 9.99 s/24 h).

Note:

Quartz-crystal watches with analogue display can also be measured by inductive picking up (see point 2.5 below), provided that the time between two positive impulses does not exceed 16 seconds.

- 2.4** Quartz-crystal watches with numerical display (LCD or LED) and with frequencies other than 32 kHz

- Place the watch (with the display on the picking up side) upon the pick-up, claws open (capacitive picking up, at the level of the display), see fig. 2.4
- set the change-over switch B.1 of the pick-up to the position opposite to 32 K
- press key 1
- adjust the sensitivity (knob 5); if necessary, vary the position of the watch on the pick-up

- read off the error of rate in hundredths of a second per day (± 9.99 s/24 h).

- 2.5** Quartz-crystal watches with analogue display and with frequencies other than 32 kHz

- Place the watch upon the pick-up, claws open (inductive picking up, at the level of the stepping motor), see fig. 2.5

- set the change-over switch B.1 of the pick-up to the position opposite to 32 K
- press key 2
- set the measuring time by means of the adequate plate (13)
- set the sensitivity (knob 5) to the minimum (if necessary, vary the position of the watch on the pick-up)
- read off the error of rate in hundredths of a second per day (± 9.99 s/24 h).

Note:

Measurement is possible provided that the time between two positive impulses does not exceed 16 seconds.

- 2.6** Tuning-fork watches

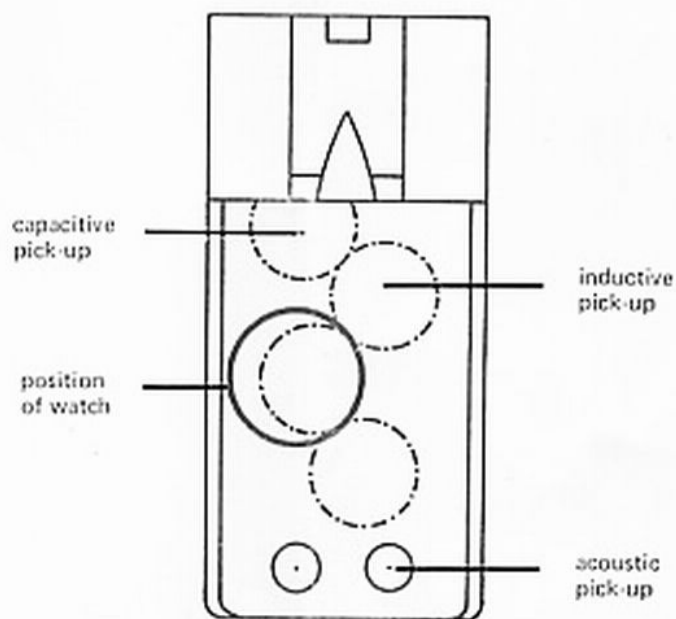
- Place the watch upon the pick-up, claws open (inductive picking up, at the level of the tuning fork), see fig. 2.5

- set the change-over switch B.1 of the pick-up to the position opposite to 32 K
- press key 3 (key 2 for any tuning-fork frequency that is not divisible by 3)
- set the sensitivity (knob 5) to the minimum (if necessary, vary the position of the watch on the pick-up)
- read off the error of rate in tenths of a second per day (± 99.9 s/24 h).

- 2.7** Mechanical watches or electric watches with motor balances

- Place the watch upon the pick-up, claws closed (acoustic picking up, at the level of the escapement), see fig. 2.3

- set the change-over switch B.1 of the pick-up to 32 K
- press key 4
- adjust the sensitivity (knob 5)
- read off the error of rate in seconds per day (± 99 s/24 h).



keys 1 and 4



key 1



keys 2 and 3

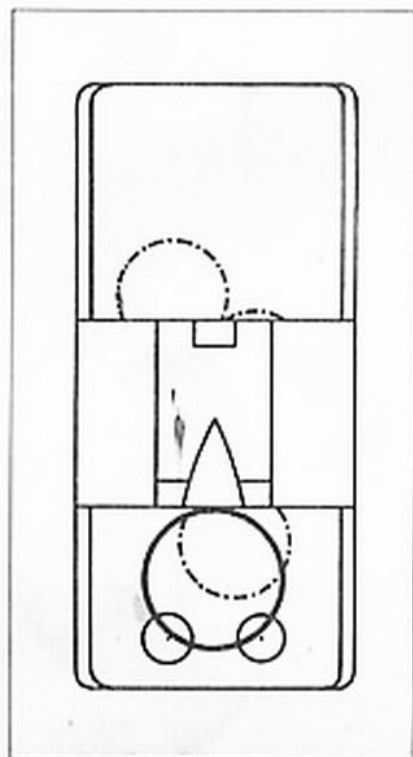


Fig. 2.3

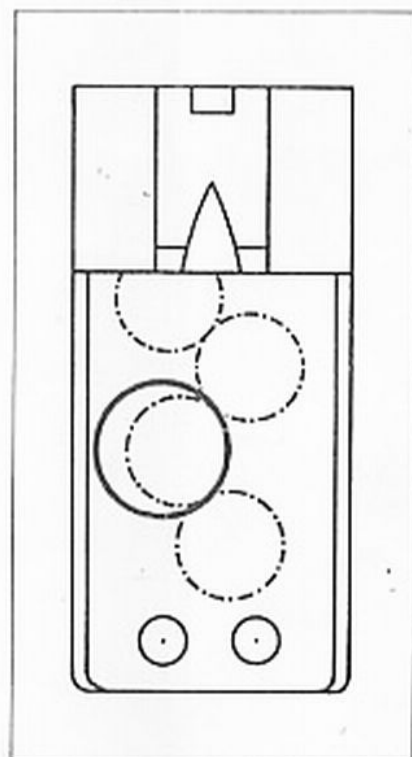


Fig. 2.4

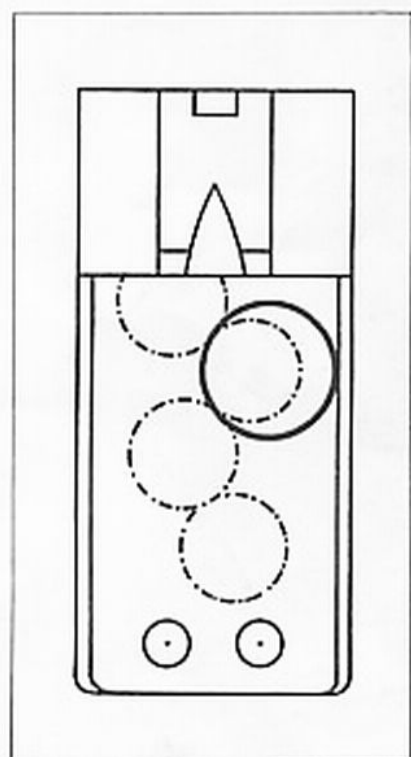


Fig. 2.5

Specifications.

Weight
9 lbs.

Dimensions
9 1/2" W x 8 1/2" L x 3 1/2" H

Power Input
105-120 Volts AC 50/60 Hz

Power Consumption
11 Watts

Quartz Crystal Oscillator
Frequency 8.64 MHz-8,640,000 Hz
Short term stability (for 4 seconds
which is standard measuring time)
 $1 \times 10^{-9} = .001$ ppm (Parts per
Million) = 1/10,000 second per day

Circuitry
Integrated circuits

Sensitivity
Automatically selected

Duration of measurement
4 seconds with possibility of selecting
another value

Pick-ups

Microphone MPQ 801S, with preamplifiers and piezoelectric (acoustic), inductive and capacitive sensors.

Optional: inductive sensor with preamplifier, for non-portable timepieces (quartz-crystal or tuning-fork types).

Display
Digital display in seconds per 24 hours
Minimum measurement
.01 sec./24 hours
Maximum measurement
99.9 sec./24 hours

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CHART FOR PROGRAMMING THE CONNECTOR BOARDS

 FROM 1 TO 16 SECONDS

<u>Measuring Time</u>	<u>Connections to be cut</u>
1 Second	Board Removed
2 "	C-D-B
3 "	C-A-D
4 "	C-D
5 "	A-D-B
6 "	D-B
7 "	A-D
8 "	D
9 "	C-A-B
10 "	C-B
11 "	C-A
12 "	C
13 "	A-B
14 "	B
15 "	A
16 "	No conn. cut

DFC.
 (N+D, T100)

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16

When testing an analogue stepping motor watch with a 1 second motor pulse, you must use an even measuring time. Example: 2 - 4 - 6 etc.



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