

vibrograf[®] B 200

solid state

Instructions for use



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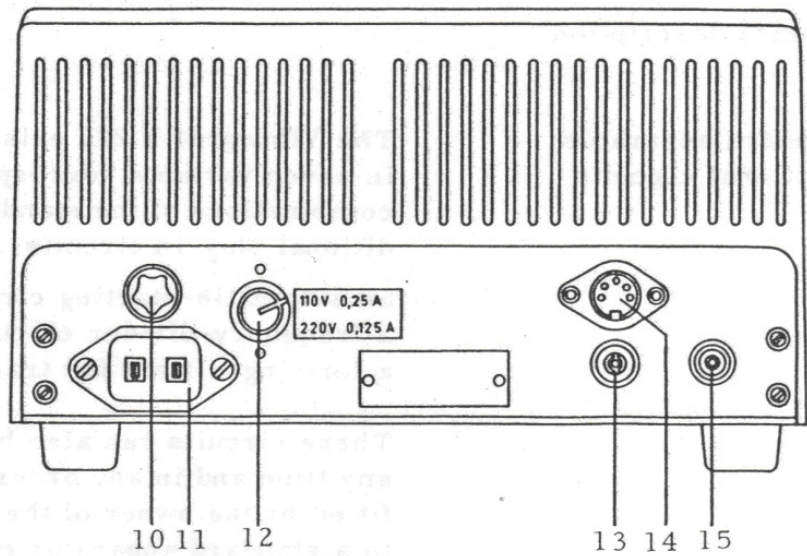


Fig. 2

- 10 Primary fuse
- 11 Mains-current input
- 12 Voltage-selector
- 13 Auxiliary 6-volt output for winder
- 14 Socket for earphone; socket for probe of forming-circuit
- 15 Microphone-input

General description

1.1 Standard apparatus; additional circuits

The Vibrograf B 200 exists in a standard model and in seven variants corresponding to the seven possible combinations of the standard apparatus with three additional plug-in circuits:

an automatic-starting circuit,
a frequency-divider circuit for tuning-fork movements,
a forming-circuit for transistorized clock-movements.

These circuits can also be purchased separately, at any time and in any order; they can be very easily fitted by the owner of the Vibrograf himself, either to a standard apparatus or to one that is partly equipped with additional circuits (see 15.1).

Apart from a few calibres with very unusual numbers of vibrations per hour (e.g. 21,306.12 Omega), all existing mechanical movements and the most widely used electromechanical movements can be tested on the standard Vibrograf B 200.

The system of additional circuits gives the Vibrograf B 200 an almost unlimited range of possible uses; in particular, it solves the watch-testing problems arising on account of the rapid evolution of horological technique.

1.2 Special time-bases

In exceptional cases (usually connected with problems of production-control), the Vibrograf B 200 can be equipped with a special time-base, instead of or in addition to the one normally used. This modification makes it possible to observe movements with very special numbers of vibrations per hour (e.g. 21,306.12 Omega; 18,049.3 sidereal time).

2 Note on the use of this instruction-booklet

The texts, drawings and tables which are printed in black apply both to the standard apparatus and for an apparatus that has been partly or completely equipped with additional circuits. The parts printed in red refer only to the Vibrograf B 200 with one or more additional circuits.

3

Checking on arrival

Before putting the apparatus into operation, make sure that:

- a the voltage-selector is in the right position (see 4)
- b the inker-ribbon is in position (see 6)
- c the roll of paper is in position (see 7).

Users are strongly advised to read these instructions carefully and to perform the various operations in the order indicated.

4

Checking the position of the voltage-selector

Before connecting the apparatus to the mains, check the position of the voltage-selector 12; if it does not correspond to the voltage of the mains, proceed as follows:

- a remove the selector from its socket
- b having turned it into the position corresponding to the voltage of the mains, replace the selector in its socket; for 125-volt mains, set the selector to 110 V
- c make sure that the value of the primary fuse 10 is suitable for the feed-current voltage:
0.25 A for 110-125 V
0.125 A for 220 V
(standard fuse DIN 41571/41680 or SNV 24480).

The secondary fuse 8 (inside the apparatus) has a value of 500 mA; under no circumstances should a fuse with another value be substituted for it.

To remove the fuse, press it down and turn it.

5

Connections

5.1

Mains

Connect the plug 11 to the mains.

5.2

Microphone

Connect the microphone to the input 15.

5.3

Earphone (optional)

Connect the earphone to the socket 14.

5.4

Automatic winder (optional) Connect the winder to the socket 13.

6

Fitting the inker-ribbon

Caution !

Before removing the worn-out inker-ribbon or fitting a new one, pull the paper away from the striker-system.

6.1

Removing the worn-out ribbon

- a using a small screwdriver, remove the elastic retaining-washers which are fitted on the spool-spindles
- b take hold of the two spools at the same time and remove them from their spindles, as shown in fig. 3
- c stretch the ribbon and slip it out of its guide-path
- d wind the entire ribbon on to the fuller of the two spools and remove the empty spool.

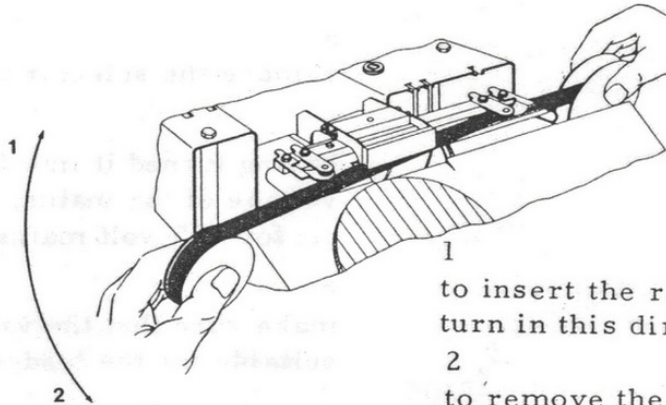


Fig. 3

1 to insert the ribbon, turn in this direction

2 to remove the ribbon, turn in this direction

6.2

Fitting the new ribbon

- a hook the end of the new ribbon to the hub of the empty spool
- b wind about 8 inches of ribbon on to the empty spool, bearing in mind that the ribbon has to unwind from the top (see fig. 3)
- c take hold of the two spools at the same time and stretch the ribbon; insert it under the anvil of the striker-system and under the two reversing-contacts situated at the ends of the guide-path (see fig. 3)
- d fit the two spools on to their spindles, making sure that the driving-catches are properly engaged in the hubs
- e fix the retaining-washers on to the spool-spindles
- f replace the paper.

Fitting the roll of paper

Note

Use only the type of paper prescribed by the manufacturers of the Vibrograf. This paper can be obtained from the distributors listed on page

- a
open the cover
- b
make sure that the motor is not running (key 4 disconnected)
- c
cut the end of the paper tape diagonally
- d
take the spindle out of its recess and insert it into the hub of the roll of paper
- e
fit the roll of paper in position by inserting the spindle into its recess; make sure that the paper unwinds from the top (see fig. 1)
- f
pass the paper tape under the striking-device and the inker-ribbon, as shown in fig. 1
- g
pass the paper tape under the reading-disc 5 and the lever 6, after having set the latter in equilibrium between positions 1 and 1/2; pass the tape under the paper-guide (see fig. 1).

8

Starting the apparatus

8.1

Standard Vibrograf B 200
(without automatic-starting circuit)

- a
turn the potentiometer 2 to the right until a click is heard; the apparatus is now switched on, and the pilot-lamp 3 will light up
- b
set the lever 6 in the position corresponding to the rate of feed required
- c
press the selector-key corresponding to the number of vibrations per hour of the movement to be tested (see table 17)
- d
place the movement on the microphone and press the key 4; recording will now commence
- e
to stop the recording, press the key 4 a second time.

8.1.1

Important note:

The commutator 9 should be left in the "non-automatic" position (fig. 4).

When the commutator 9 is in the "automatic" position, the machine will not work.

8.2

Vibrograf B 200 with automatic-starting circuit

When the key 4 is pressed down, the recording is made entirely automatically (the paper-feed starts as soon as a watch is placed on the microphone; when the watch is removed, the paper-feed stops).

If you do not wish to use the automatic control, you can use the apparatus as indicated under 8.1 (paper-feed controlled by means of the key 4).

8.2.1

Important note

When the number of vibrations per hour is low (less than 7,200 v/h, i.e. 2 pulses per second), the automatic paper-feed control may fail to work.

If this happens, the automatic-starting circuit must be disconnected as follows:

a

open the cover

b

set the commutator 9 to the "non-automatic" position.

To start the apparatus and to stop the recording, use the key 4 (see 8.1).

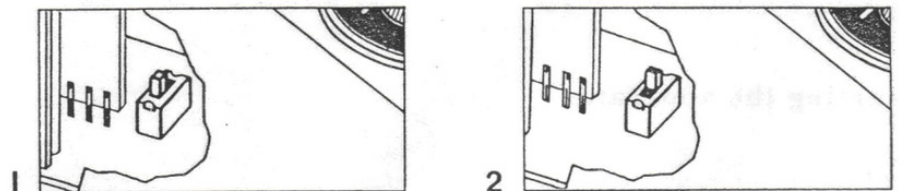


Fig. 4

1

"automatic" position

2

"non-automatic" position

9

Adjusting the amplification

Turn the potentiometer 2 to the right until striking is regular, then examine the trace obtained.

Widely dispersed dots may appear: this means that the level of amplification is too high. Turn the potentiometer 2 to the left until the parasitic dots disappear.

The trace may be slightly sinuous and the beat-indication may seem excessive; this means that the level of amplification is not sufficient. Turn the potentiometer 2 to the right until the trace has a normal appear-

10

Measuring the error of rate

a

by turning the knob 1, set the strokes of the disc 5 parallel with the trace

b

read off the error of rate on the reading-scale of the knob 1; when the driving-lever 6 is in position 1/2, the values shown represent twice the true error.

11

Adjusting the striking-force

The Vibrograf B 200 is fitted with a striker-stirrup whose force can be adjusted. To make this adjustment, leave the printer-system running and proceed as follows (see fig. 5):

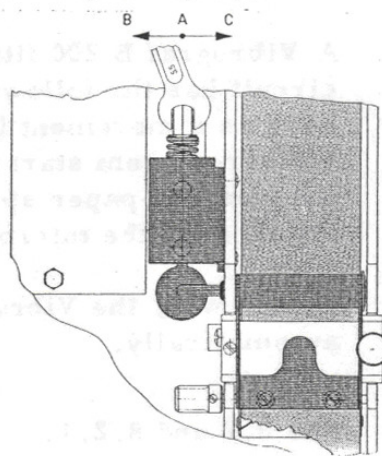


Fig. 5

striking too heavy = turn the knurled knob in the direction AB

striking too light = turn the knurled knob in the direction AC.

12

Notes

12.1

Note on the microphone MP 86

The microphone MP 86 supplied with each Vibrograf B 200 is marked with the symbol of the escapement, together with the lightning-flash symbolizing electric energy. This means that it is fitted with a crystal for recording mechanical noises and inductance-coils for picking up variations in magnetic fields; these variations are generally used for testing electric or electronic watches with the frequency-divider circuit for tuning-fork movements (see 13.2).

The switch-over from the crystal to the inductance-coils is automatic. Also see table 16.

12.2

Note on testing electro-mechanical movements with balances fitted with permanent magnets

Certain electromechanical movements, like calibre ESA 9150, have balances fitted with permanent magnets. When they are not cased up, these movements require certain precautions during the testing-process; in particular, they should not be placed close to any metallic parts that might upset the oscillations of the balance. For checking the rate, it is preferable to use the microphonic probe MP 18.

13

Additional circuits

13.1

Automatic-starting circuit

13.1.1

Description

A Vibrograf B 200 fitted with an automatic-starting circuit has the following functional peculiarity: as soon as a movement is placed on the microphone, the striker-system starts working and the paper-feed commences; the paper stops unwinding when the movement is taken off the microphone.

In this way, the Vibrograf B 200 is controlled entirely automatically.

13.1.2

Incidences on the possibilities of using the Vibrograf B 200

See 8.2 and 8.2.1.

13.2

Divider-circuit for tuning-fork movements

13.2.1

Description

Watches equipped with tuning-fork oscillators are notable for their high frequency. The Accutron[®], for instance, has a frequency of 360 c/s, which corresponds to 2,592,000 vibrations per hour.

To check the rate of such watches, it is necessary to reduce the frequency of the tuning-fork to a value suitable for the measuring-device of the Vibrograf; this is done by means of the divider-circuit.

13.2.2

Incidences on the possibilities of using the Vibrograf B 200

The divider-circuit for tuning-fork movements makes it possible to test all the tuning-fork watches that are in existence at the present time; it has also been designed in anticipation of movements that are likely to be brought out in the future.

Table for the use of the Vibrograf B 200 with divider-circuit for tuning-fork movements

Frequency of movement before division	Division factor	Number of pulses after division	Selector-key to be pressed for observing the movement
300 c/s	60	5	18,000
360 c/s	60	6	17,280, 18,000 or 21,600
480 c/s	60	8	17,280
720 c/s	60	12*	17,280 or 21,600

* In certain conditions, the movement 720 c/s gives 6 pulses (instead of 12) after division; nevertheless, the rate is measured normally

Also see tables 16 and 17.

13.3

Forming-circuit for transistorized clock-movements

13.3.1

Description

Some transistorized clock-movements can be observed neither on the basis of the noises of the escapement, nor on the basis of the feed-current impulses in their original state.

For checking the rate and functions of these movements, it is necessary to use a special probe and a forming-circuit. This circuit gives the feed-current impulses a form which enables them to control the striker-system of the Vibrograf B 200; the probe is inserted into the feed-circuit of the movement to be tested.

13.3.2

Incidences on the possibilities of using the Vibrograf B 200

The forming-circuit makes it possible, in particular, to test transistorized table-clock movements of the following types: Hettich (36,000 vibrations per hour), Diectron (48,000 vibrations per hour; record with 6 traces) and Derby (28,800 vibrations per hour).

For these tests, place the pallet of the probe between one of the poles of the battery and the contact-screw of the battery-holder. The probe (which is always supplied with the circuit) should be connected to the socket 14.

To adjust the potentiometer of the probe, proceed as follows:

a
using a screwdriver, turn the potentiometer anticlockwise as far as its stop

b
turn the potentiometer clockwise until striking is regular and then, for safety's sake, turn it a few degrees more in the same direction.

If recording is not satisfactory, turn the pallet of the probe over or connect the latter to the other pole of the battery.

13.4

Purchase of additional circuits

The additional circuits for the Vibrograf B 200 (automatic-starting circuit, divider-circuit for tuning-fork movements, forming-circuit for transistorized clock-movements) can be purchased at any time and in any order. They are sold by the Vibrograf distributors listed on page

13.5

Fitting an additional circuit

See 15.1.

14

Possible operational disorders

14.1

Mechanical recorder

All the rotating parts of the apparatus turn in self-lubricating bearings fitted with dust-covers. The bronze and steel gears are practically unwearable. They have pivots of large diameter, of highly resistant steel, which eliminates any risk of breakage or seizure. All these parts are enclosed in an unbendable die-cast case.

The mechanism of the Vibrograf B 200 thus needs no attention; in particular, it should not be oiled.

14.2

Electronic portion

All foreseeable causes of breakdowns having been eliminated in the course of the designing and construction of the Vibrograf B 200, particularly by the use of very

reliable industrial transistors and plug-in printed circuits, it is most unlikely that the apparatus will break down. All the precautions taken for this purpose are sufficient justification for classing the Vibrograf B 200 among apparatus of the "solid-state" type.

If, nevertheless, for an accidental reason, a breakdown should occur, it can be localized by the user himself, with the help of the diagram below (14.3).

In the event of one of the anomalies mentioned opposite fig. 6 (point 14.3), it is advisable purely and simply to replace the faulty circuit which is the cause of the trouble (this circuit is indicated by an arrow); the electronic components (resistances, condensers, transistors, etc.) should not under any circumstances be unsoldered or resoldered. The faulty circuit should be sent to the nearest Vibrograf agent (see list, page 20), who will send a new circuit immediately.

Removing and fitting circuits: see 15.

14.3

Diagram for locating electrical breakdowns

In the cases envisaged here, it is supposed that:

- 1 the apparatus is being normally supplied with current (leads in good condition, primary fuse 10 intact and properly screwed in); control: pilot-lamp 3 alight
- 2 the microphone is working correctly
- 3 the watch used for testing the Vibrograf is in proper order
- 4 apparatus without automatic-starting circuit: the commutator 9 is in the "non-automatic" position; with automatic-starting circuit: the commutator 9 is in the "automatic" position.

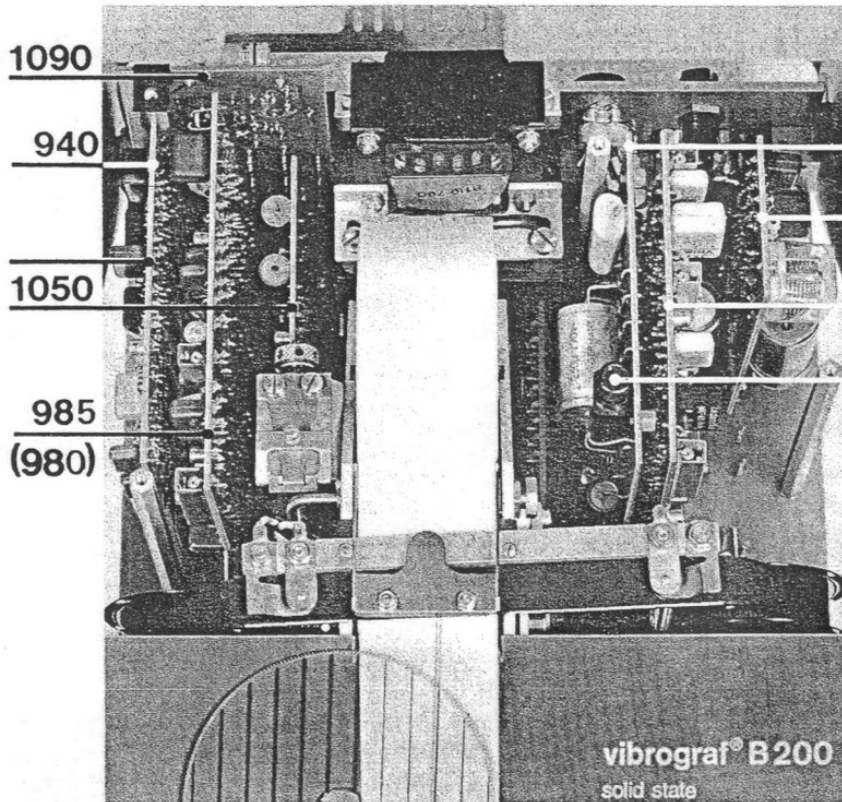
These four points should always be checked first of all.

electric movements cannot be tested, but it is still possible to test mechanical movements normally

the striker will not work, the trace is blurred, or the automatic paper-feed device does not work correctly

the paper will not unwind when a movement is placed on the microphone; it goes on unwinding after the movement has been taken off the microphone

tuning-fork movements cannot be tested, but it is still possible to test mechanical movements



- 880 the motor will not turn and the striker will not work
- 1920 the inclination of the trace no longer corresponds to the true rate of the watch or is illegible; the record is formed of several traces; the motor will not turn
- (910)
- 860
- (855) the motor will not turn and the striker will not work, but the pilot-lamp 3 lights up (to remove the secondary fuse, press it down and turn it)

- 880 current-feed circuit
- 860(855) converter
- 1920(910) oscillator
- 940 amplifier (sound and striking)
- 1050 automatic-starting circuit
- 1090 forming-circuit for transistorized clock-movements
- 985 (980) divider-circuit for tuning-fork movements

Note

In one of the cases (diagram 14.3), the same operational anomaly has two possible causes (faulty circuit 1920(910) or circuit 860(855).

For remedying the breakdown, proceed as follows:

1

first replace the circuit 1920 (910)

2

if this replacement has no effect, replace the circuit 860(855).

15

Removing a printed circuit

a

pull out all plugs connected to the back of the apparatus

b

having taken out its fixing-screws, remove the screening which covers the circuit to be removed* (to loosen the screws, use the wrench supplied with the apparatus)

c

disconnect the circuit by pulling it upwards carefully (the circuits are fixed to the base-plate by means of plug-pins).

* to identify the circuits, refer to fig. 6.

15.1

Fitting a printed circuit

a

make sure that all plugs of the apparatus are disconnected ; remove the screening as indicated above

b

find the exact position of the circuit by comparing the reference on its back with those indicated in fig. 6; when noting the circuit-reference, take only the last group of figures into account, as for fig. 6

c

having turned it in the right direction (see fig. 6), hold the circuit upright and place it in position by inserting the plug-pins into the corresponding pins of the base-plate; this must be done carefully; in particular, make sure not to bend the pins

d

replace the screening and tighten the fixing-screws.

Note concerning circuit 1920(910) (oscillator)

This circuit should be fixed to the first three plug-pins from the edge of the base-plate (at the rear of the apparatus; see fig. 6). The other three pins are pro-

Conditions of observation
for the various existing
types of movements

Type of movement, calibre	Phenomenon used for ob- servation			Microphone MP 86	Additional circuits	
	mechanical noises	feed - current impulses	variations of magnetic fields		forming - circuit + probe	divider - circuit for tuning - fork movements
Mechanical movements	■			■		
Motor-balance electric movements 1st possibility 2nd possibility	■	■		■	■	
Tuning-fork movements			■	■		■
Transistorized clock-movements Hettich Dilectron Derby (other calibres of this type: same conditions as for motor-balance electric movements)		■ ■ ■			■ ■ ■	

Also see table 17.

For special cases, please consult the manufacturers or a Vibrograf agent (list on page20).

Chief numbers of vibrations per hour observable

Also see table 16.

	tuning-fork movements	transistorized clock-movements	mechanical and electro-mechanical movements	
N = number of passages of tracer-organ per second		Derby 28,800	3,600 7,200 10,800 14,400 17,280 21,600 28,800	Key 17,280 N = 24
	360 c/s 480 c/s 720 c/s	Hettich Dilectron** 36,000 48,000	3,600 6,000 7,200 9,000 18,000 21,600 24,000* 27,000 36,000	Key 18,000 N = 30
			3,600 7,200 10,800 11,880 14,850 19,800 21,600* 26,400*	Key 19,800 N = 33
	360 c/s*		3,600 7,200 10,800 14,400 16,200 21,600 28,800* 32,400	Key 21,600 N = 36
	360 c/s 480 c/s* 720 c/s			
			Standard Vibrograf B 200	
			Standard Vibrograf B 200 + circuit for transistorized clock-movements	
			Standard Vibrograf B 200 + divider-circuit for tuning-fork movements	
			Standard Vibrograf B 200 + divider-circuit for tuning-fork movements + circuit for transistorized clock-movements	

* 2 traces, error of beat not observable
 ** 6 traces, error of beat not observable

17.1

Formula for finding the numbers of vibrations per hour compatible with the measuring-system of the Vibrograf B 200

Use the following formula :

$$\frac{N \times 3,600}{\text{number of vibrations per hour of the movement}} = R$$

N = number of passages of the tracer-organ per second
(see table 17)

R = result

If the result R is a whole number, the movement is observable; to record, press the vibration-key corresponding to the N-value used for the calculation (see table 17).

If the result comprises a single decimal and this = 5 (e.g. 17.5), the movement is also observable; however, the record will have two traces and will not show the error of beat.

A number of vibrations per hour is incompatible with the measuring-system of the Vibrograf B 200 when the four possible N-values have been successively used for the calculation and none of them has given a result meeting one of the two conditions mentioned above.

Practical examples:

Case 1

$$\frac{30 \times 3,600}{9,000} = 12$$

The result is a whole number.

A movement with 9,000 vibrations per hour is thus observable in the 18,000 group (18,000 key pressed down) it produces a normal record with 1 trace.

Case 2

$$\frac{33 \times 3,600}{21,600} = 5.5$$

The result comprises a single decimal, which = 5. In the 19,800 group (19,800 key pressed down), a movement with 21,600 vibrations per hour thus produces a record with 2 traces.

With N = 24, N = 30 or N = 36, the result gives a whole number; this means that a normal record is obtained in the 17,280, 18,000 and 21,600 groups.

Case 3

$$\frac{30 \times 3,600}{28,800} = 3.75$$

The result comprises two decimals.

Thus a movement with 28,800 vibrations per hour is not observable in the 18,000 group.

With $N = 24$, the calculation gives a whole number: this means that the movement is observable in the 17,280 group and produces a normal record in this case.

18

Interpretation of traces

Refer to the brochure "Interpretation of Traces", which is supplied with each apparatus.

In each case, it is necessary to bear in mind the nature of the phenomenon on which the observation is based (mechanical noises, variations of magnetic field or feed-current impulses). See table 16.

19

Guarantee

Vibrograf appliances and microphones are guaranteed free from any defect due to faulty material or manufacture, for a period of two full years from the date of purchase. This guarantee is without effect if any person not authorized by Reno SA has interfered with the apparatus or if the instructions for use have not been complied with.

In the event of repairs carried out under guarantee, the cost of transport is for the customer's account.

The vibrograf[®] B 200 is a Portescap product manufactured by Portescap, La Chaux-de-Fonds, Switzerland, creators of the incabloc[®] shock-absorber.

General distributors:

Portescap
Watch-equipment division
165, rue Numa-Droz
CH-2300 La Chaux-de-Fonds
Switzerland
Tel. (039) 21 11 41
Telex 952 127 scap ch



Vibrograf B 200

Maintenance

1

Cleaning the case
and keys

Using a damp cloth, wipe the parts that need cleaning.
To remove obstinate stains, use soapy water or rectified benzine.

Caution : On no account use solvents, abrasives or any other products that might damage the paint.

2

Cleaning the inside face
of the reticulated disc
(with-out removing it)

Take a strip of clean paper, soak it in rectified benzine, fold it several times to make it thicker and pass it underneath the disc, turning the latter in both directions.

The paper used for recording traces is perfectly suitable for this purpose.

3

Replacing the pilot lamp*

When the apparatus is working normally but the pilot lamp fails to light up, change the bulb in the following way :

a

disconnect the apparatus from the mains

b

take out the green lens, using a knife if necessary

c

take out the burnt-out bulb with a pair of tweezers

d

push the new bulb into its support and replace the lens.

4

Replacing the paper-drive
roller*

After the apparatus has been in operation for several years, it may be found that the rubber covering of the roller has become deformed, hardened or split. In this case, it will be necessary to change the roller, proceeding as follows :

a

using a screwdriver, remove the circular clip which is fixed to the end of the roller spindle

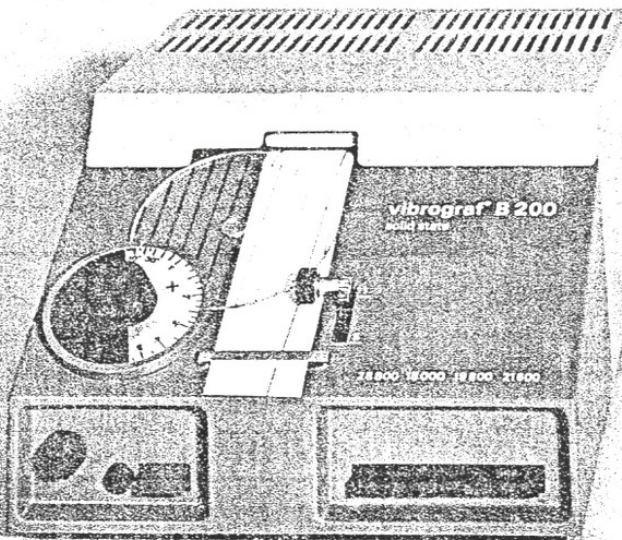
b

place the new roller on its spindle and fix the circular clip with the help of a pair of flat-nose pliers.

* Spare parts can be obtained from the distributors listed in the Vibrograf B 200 instruction manual.

vibrograf® B 200

solid state



Timing machine with paper-tape recording system, for all mechanical, electrical and tuning-fork watches. Measurement of instantaneous rate and error of beat, localization of internal movement faults.

Modular construction with only one function per circuit. Interchangeable plug in circuit boards: exchange of circuits is carried out by the user.

Four basic circuits; plus the following three optional circuits:

- a) for tuning-fork movements,
- b) for transistorized clock movements, and
- c) for automatic-starting.

High-fidelity trace; demultiplied read-out system; two rates of paper feed (1 and 1/2).

Quartz crystal 5 MHz. Accuracy ± 1 s/24 h between 0 and + 50°C.

Transistors of professional quality. Bronze and steel gears with self-lubricated bearings. Unbendable die-cast aluminium case.

* Not optional - supplied with machine.

Accessories supplied with the apparatus: stand microphone MP 86, probe microphone MP 19, 10 rolls of paper, dust-cover, instructions for use, note on the interpretation of traces, self-sticking sign for windows and show/cases.

Two-year guarantee!

Ref. 001 (with 4 basic circuits and accessories).

Basic Vibrograf® circuits

The four basic plug-in circuits form the standard electronic equipment of the Vibrograf® B 200. They enable the user to test all types of movements with sprung balances, including those which are battery-powered.

With the plug-in modular circuits, nothing could be simpler than dealing with breakdowns; replacement circuits are sent by mail!

In a few seconds, the Vibrograf® measures the rate, indicates the error of beat and localizes the internal faults of the watch movement: a simple, accurate analysis in the form of a perfectly clear, legible trace. Fourteen typical cases are reproduced and explained in the note "Interpretation of Vibrograf Traces", which is supplied free of charge with each instrument.

Examples: damaged tooth on escape wheel, overbanking, damaged pallet stone escape wheel not perfectly round, etc.

The exchange of these circuits can be effected by the user himself (the instructions for use indicate the procedure for localizing electric failures and for identifying and fitting the circuits).

Ref. 002: current-feed circuit 880
 Ref. 003: converter 860
 Ref. 004: oscillator 1920 (quartz)
 Ref. 005: amplifier 940
 (sound and striking)

Optional Vibrograf® circuits

Each optional circuit gives the Vibrograf® an additional capability. They can be purchased and fitted at any time without any special knowledge.

Ref. 006: divider circuit 985 for tuning-fork movements (300, 360, 480 and 720 Hz).

Ref. 007: forming circuit 1090, with probe, for transistorized clock movements.

Ref. 009: automatic-starting circuit 1050 (the watch itself gives the signal which starts the paper-feed system).

Ref. 008: probe only for forming circuit 1090.



PORTESCAP U.S.
 VIBROGRAF® MACHINE DIV.
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 Lake Success, N.Y. 11042
 (516) 437-8700



**Portescap
Reno SA**
CH - 2300 La Chaux-de-Fonds
Suisse / Switzerland

C 27575



**Portescap
Reno SA**
CH - 2300 La Chaux-de-Fonds
Suisse / Switzerland

G 27575

type de machine

n° 181863

Maschinentyp
type of machine
tipo de máquina

B200

date de livraison

Lieferdatum
delivery date
fecha de entrega

FEB 4/80

**Certificat de livraison-Lieferschein-
delivery certificate-certificado de
entrega.**

type de machine

n° 181863

Maschinentyp
type of machine
tipo de máquina

B200

date de livraison

Lieferdatum
delivery date
fecha de entrega

nom

Name/name/apellido

n° et rue

Strasse und Nr./No and street/calle y No

localité

Ort/locality/localidad

pays

Land/country/pais

IBM CH 42 255

diagrams

1	Running accurately	2	3	2 Fast 3 Slow	4	Irregularity of beat
5	Damaged tooth on escape-wheel	6		Balance knocking	7	Faulty escapement or damaged pallet-stone
8	Escape-wheel out-of- round	9		Variation in balance amplitude	10	Irregular transmission or dirty escapement
11	12	11 Balance not isochro- nous 12 Balance isochronous, but not in poise	13	Excessive sideshake on pallet-staff or balance pivots, or defective train	14	Variation in running of balance, poor transmis- sion, loss of amplitude

vibrograf®