# Vibrograf  B 600 M / Q

# User manual
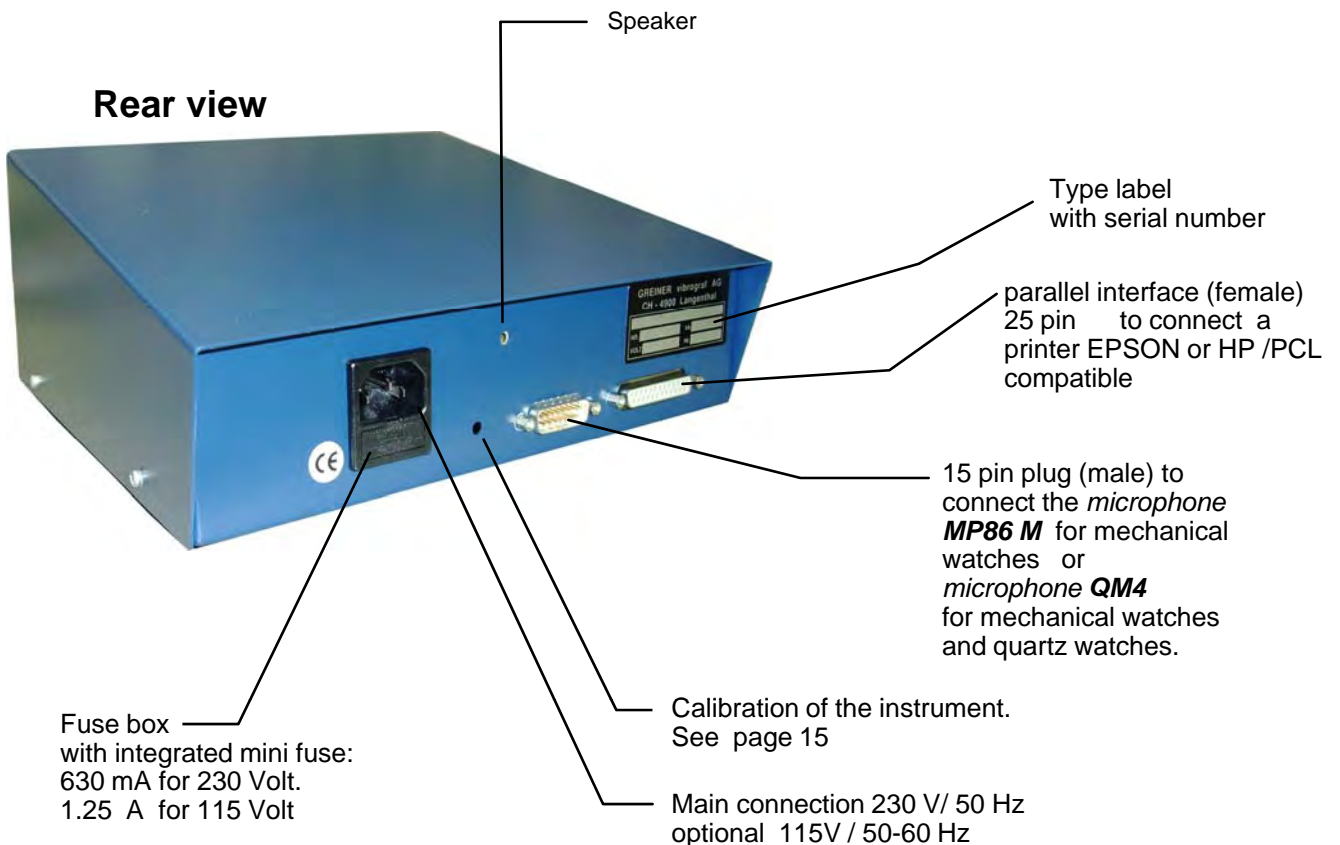
## Front-view

Watch-type

Beat of watch

Lift angle

Measuring time

Start / Stop button starts and stops the measuring cycle

Pushbuttons for selections

level indicator lamp lights, if a measuring cycle is started.

volume knob for incoming watch -signal

Display, screen

Diagram of time deviation

Control lamp lights if the screen datas have been stored for printout.

On / Off switch and volume adjust for internal speaker

MECHANIC   NFIXED : 21600   LA: 52   MT: 2

+

−

+/   26 s/d   218°   0,2 ms

Vibrograf B 600   Watch Tester   Greiner vibrograf

+ / - sign

time deviation

Amplitude value

out of beat value

## Rear view

Speaker

Type label with serial number

parallel interface (female) 25 pin    to connect a printer EPSON or HP /PCL compatible

GREINER vibrograf AG CH - 4900 Langenthal

15 pin plug (male) to connect the *microphone MP86 M* for mechanical watches   or *microphone QM4* for mechanical watches and quartz watches.

Fuse box with integrated mini fuse: 630 mA for 230 Volt. 1.25  A  for 115 Volt

Calibration of the instrument. See  page 15

Main connection 230 V/ 50 Hz optional  115V / 50-60 Hz

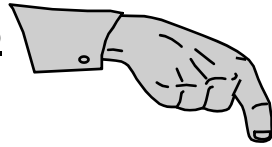## CONTROL BUTTONS

Start / Stop button
starts and stops the
measuring cycle
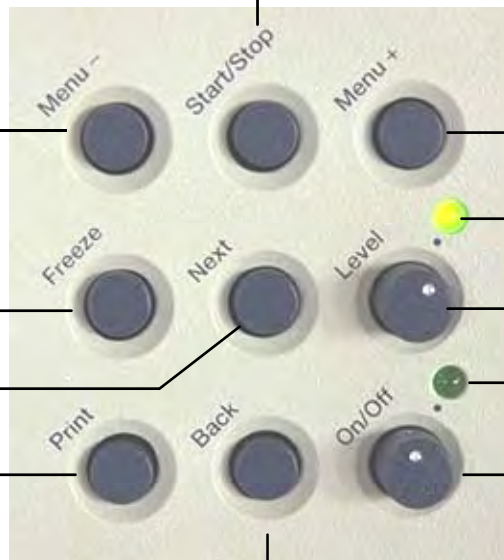
1.Selects the preceding
MENU - point.
2. Decreas of a value.

1.Stores the display
datas for printout.
2. Switches to the
double beat.

Goas to the next
MENU - point.

1. Starts the printout.
2. Switches to the single
beat..
3. Shows the menu for
system  changements.

Goas to the preceding
MENU - point.

Selects the next
MENU - point. -or-
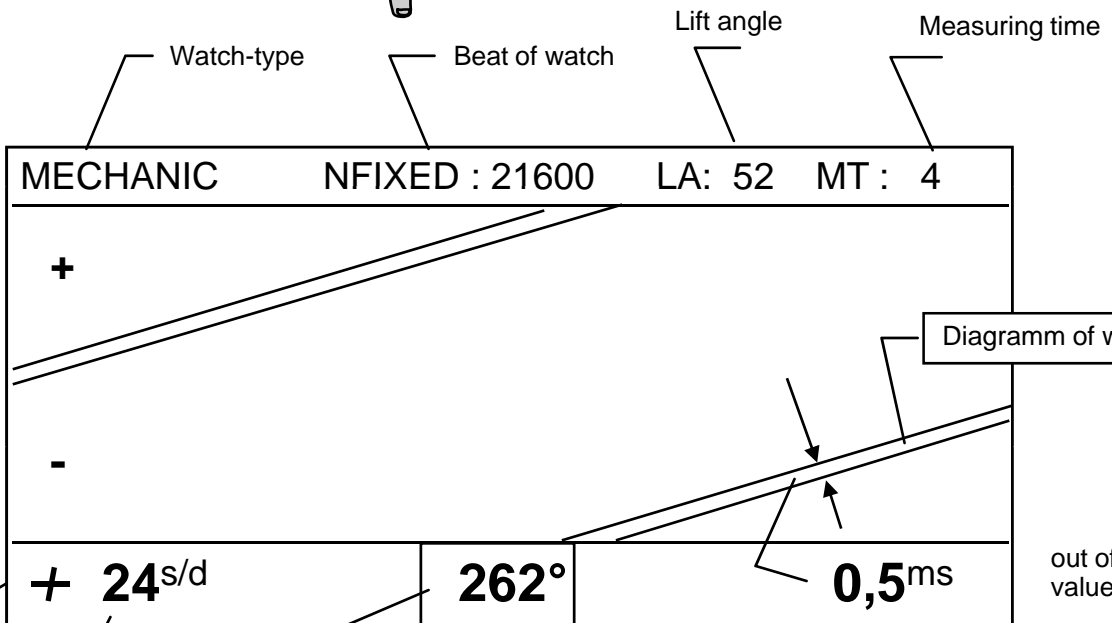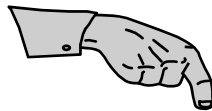increases the value.

level indicator
lamp lights, if a
measuring cycle
is started.

volume knob
for incoming
watch -signal

Control lamp lights if
the screen datas
have been stored for
printout.

On / Off switch
and volume adjust
for internal speaker

## Display, screen

Watch-type     Beat of watch     Lift angle     Measuring time

| MECHANIC | NFIXED : 21600 | LA:  52 | MT :   4 |

Diagramm of watch

**+**

**-**

**+  24**s/d          **262°**                **0,5**ms          out of beat value
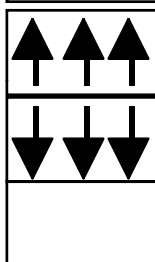
+ / - sign          time deviation          Amplitude value

▲▲▲  = Turn the Level knob c.c.w.

▼▼▼  = Turn the Level knob c.w.

= Value of ( MS WINDOW ) is too high

## Microphone MP86M  for mechanical watches

The MP86M is a active microphone equipped with a high sensitiv cristal
and electronic components.
Connect the microphonecable to the 15 pin male plug on the rear of the  B 600.
See also page x

The watchcase or the crown must touch correctly
the activ front pins.
This pins, or so called fork , transmitts the
watch sound (noise) to the cristal inside the
microphone.
The cristal converts the noise in electrical signals.
Through the built in electronic and the cable,
the signals reaches the B 600.
The signals are converted in digital values and
in a diagramm.

## Clamp - microphone  for pocket-watches and clocks.

The clamp-microphone may be connected to the 15 pin male plug on the rear of the  B 600
instead of the MP86M.

## Light barrier for clocks.

The light barrier may be connected to the 15 pin male plug on the rear of the  B 600
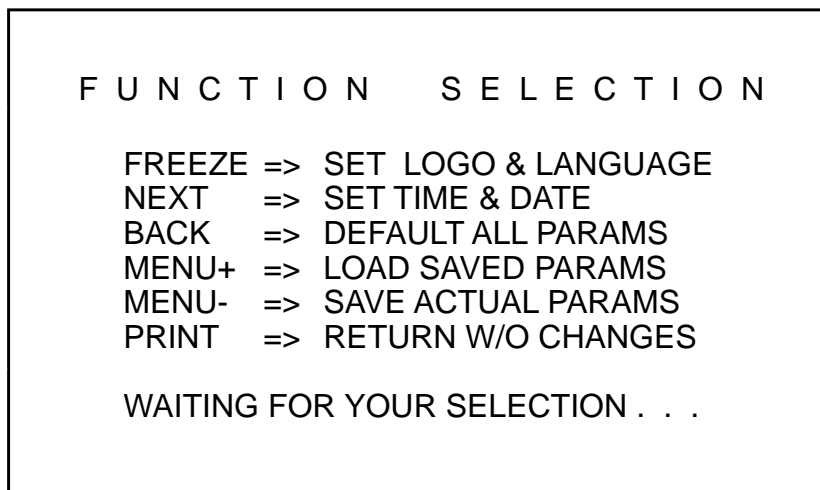instead of the MP86M.

**Light barrier**

## 1.1   The following parameters can be set in your   (B 600)

a. Your prefered language   :   English ,  Dutch , French ,  Italian , German
b. Your Name and Adress   :   for printout together with results.
c. Printer type   :   EPSON (FX 80 ) or compatible  or,  HP PCL or compatible
d. Date & Time   :    Set the actual date and time of your country.
e. Your prefered presettings after switching on the B 600.
   For example :  Watch type, measuring time, automatic or fixed beat selection, etc.

## 1.2   How to display  the Configuration screen ?  (picture 10)

a. Switch on the B 600 .     Wait until the main menu is displayed.
b. Press - PRINT-     The following  MENU  is displayed in one of the 5 languages.

picture 10

```
    F U N C T I O N    S E L E C T I O N

       FREEZE => SET  LOGO & LANGUAGE
       NEXT    => SET TIME & DATE
       BACK    => DEFAULT ALL PARAMS
       MENU+  => LOAD SAVED PARAMS
       MENU-   => SAVE ACTUAL PARAMS
       PRINT    => RETURN W/O CHANGES

       WAITING FOR YOUR SELECTION . . .
```

## 1.3   Change the language

a. Execute step 1.2
b. Press  - FREEZE     The corresponding Menu is displayed.
c. Press  - BACK /  BACK /     The language field  is  active.
d. Press  - MENU +     press it until the desired language appears.
e. Press  - PRINT /  PRINT /  MENU -  The selection will be stored.

From this moment, the   B 600  works with the selected language.

## 1.4  Enter your Name and Adress

a. Execute step 1.2
b. Press  - FREEZE     The curser stays on the left side of the 2. line.
c. Press  - NEXT   ......     Until the curser stays on the position for the 1. sign.
d. Press  - MENU + or MENU -     Until the desired sign appears.
e. Press   - NEXT   ......     Until the curser stays on the position for the 2. sign.
f.  Press  - MENU + or MENU -     Until the desired sign appears.
g. Go on this way until the text looks as you wish.
h. Press  - PRINT /  PRINT /  MENU -  The selection will be stored.

## 1.5   Set Time & Date

a. Execute step 1.2

b. Press   - NEXT                  Programmed Time and Date is displayed.
                                              Cursor stays on hour.

c.  Press   - MENU + or MENU -       Until the desired hour appears.

d. Press   - NEXT                  Cursor stays on minute.

e. Press   - MENU + or MENU -       Until the desired minute appears.

f.  Press   - NEXT                  Cursor stays on second.

g. Press   - MENU + or MENU -       Until the desired second appears.

h. Press   - NEXT                  Cursor stays on day.

i.  Press   - MENU + or MENU -       Until the desired day appears.

k. Press   - NEXT                  Cursor stays on month.

l.  Press   - MENU + or MENU -       Until the desired month appears.

m. Press   - NEXT                  Cursor stays on year.

n. Press   - MENU + or MENU -       Until the desired year appears.

o. Press   - PRINT /  PRINT /  (MENU -)     The selection will be stored.
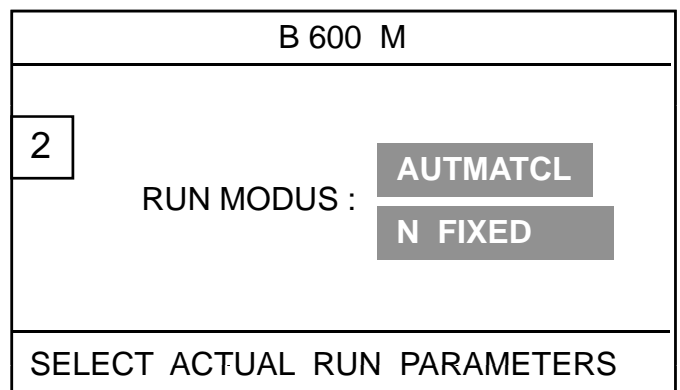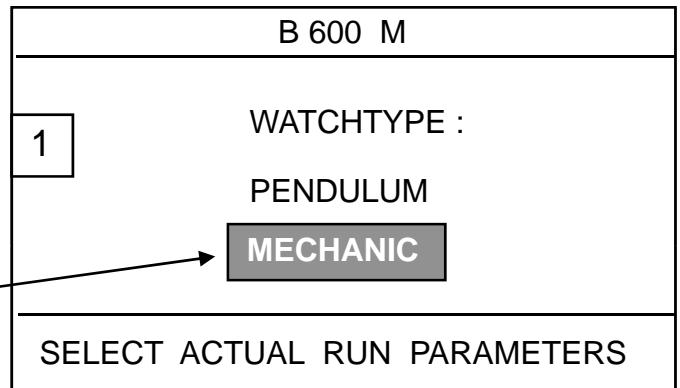
## 1.6   Set the desired test parameters

a. Switch on the B 600 and wait until
the screen 1 is displayed :

## 1.7   Set the desired test parameters for mechanical watches.

a. Press (Menu + ) to select the watchtype:
    MECHANIC

b. Press  (NEXT) screen 2 is displayed
    By pressing (MENU + ) you may select
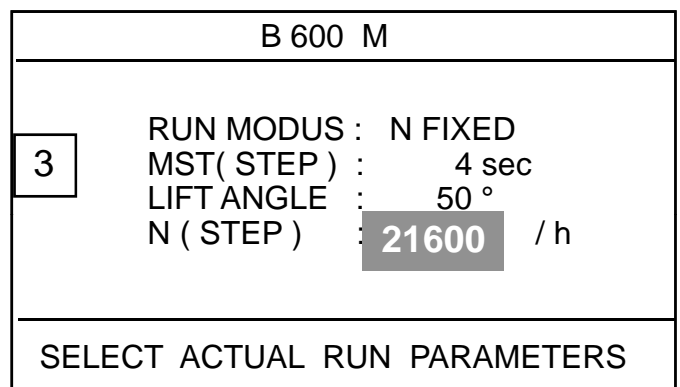    AUTOMATCL  beat selection or N FIXED

**AUTMATCL**     The B 600 detects
                        automatically the beat
                        of the watch.

**N FIXED**     The beat can be set
                      manually from :
                      3600  to  36000 by steps.

## 1.8   Set the desired MST LIFT ANGLE and BEAT FREQUENCY

See next page for explanations !

---

**B 600 M**

1     WATCHTYPE :

        PENDULUM

        **MECHANIC**

SELECT ACTUAL RUN PARAMETERS

---

**B 600 M**

2                  **AUTMATCL**
     RUN MODUS :
                  **N FIXED**

SELECT ACTUAL RUN PARAMETERS

---

**B 600 M**

3    RUN MODUS :  N FIXED
      MST( STEP ) :      4 sec
      LIFT ANGLE :      50 °
      N ( STEP )   :  **21600**  / h

SELECT ACTUAL RUN PARAMETERS

---

```
┌─────────────────────────────────────┐
│             B 600  M                 │
├─────────────────────────────────────┤
│                                      │
│   RUN MODUS :   N FIXED              │
│   MST( STEP ) :       4 sec          │
│   LIFT ANGLE  :       50 °           │
│   N ( STEP )   :    [ 21600 ]  / h   │
│   MS WINDOW :       100 °            │
│                                      │
├─────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS    │
└─────────────────────────────────────┘
```

Press  ( Next )
to move down in this menu.

Press  ( Back )
to move up in this menu.

Press  ( Menu + ) or ( Menu - )
to change a value in the marked line.

Press and hold ( MENU + ) to encrease
Press and hold ( MENU - )  to decrease
the value continously

```
┌─────────────────────────────────────┐
│             B 600  M                 │
├─────────────────────────────────────┤
│                                      │
│   RUN MODUS :   AUTMATCL             │
│   MST( STEP )      [  4 ] sec        │
│   MST( FINE )                        │
│   LIFT ANGLE  :      50 °            │
│   MS WINDOW :       100 °            │
│                                      │
├─────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS    │
└─────────────────────────────────────┘
```

Measuring time :  ( MST )

The result of time deviation will be
desplayed after the set value of ( MST )
and will be the meanvalue of the ( MST )
values in MST (STEP ) are:
4, 8, 12, 30, 60, sec.
values in MST ( FINE ) are:
2, up to 960 sec. in steps of 2

```
┌─────────────────────────────────────┐
│             B 600  M                 │
├─────────────────────────────────────┤
│                                      │
│   RUN MODUS :   AUTMATCL             │
│   MST( FINE )  :      4  sec         │
│   LIFT ANGLE  :    [ 50 ]  °         │
│                                      │
│   MS WINDOW :       100  °           │
│                                      │
├─────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS    │
└─────────────────────────────────────┘
```

Lift angle:  (50 - 52°)

The value of lift angle depends on
the construction of the watch. It is used
in the B 600 to calculate the amplitude.
Most watches have a lift angle of 50°-52°.
It can be set from 30° up to 70°.
If the value of lift angle is set lower than
the value of the measured watch, the
result of amplitude will be lower than
it should be. If it is set higher the result of
amplitude will be higher.
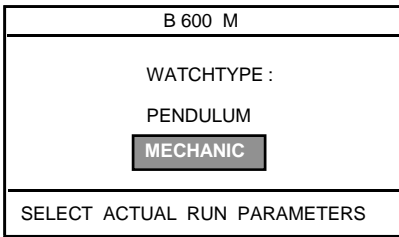
Beat frequency N (STEP) or N (FINE)

In RUN MODUS : **AUTMATCL**
the beat frequency is automatically
detected and set from the B 600 to a
standard beat.   Standard beats are :

3600,    4800,    7200,    7920,    8100,
8640.   9360,    9440,    9720,    9760,
14400,   16200,   18000,   19800,   21600,
28800,   36000,

```
┌─────────────────────────────────────┐
│             B 600  M                 │
├─────────────────────────────────────┤
│                                      │
│   RUN MODUS :   AUTMATCL             │
│   MST( STEP ) :       4  sec         │
│   LIFT ANGLE  :      50 °            │
│                                      │
│   MS WINDOW:        100°             │
│                                      │
├─────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS    │
└─────────────────────────────────────┘
```

In RUN MODUS **( N FIXED)**
The beat can be set manually from
3240 up to 39600 in N ( FINE )

## 1.9  Display and view of the watch escapment signal (noise) double or single beat

```
┌─────────────────────────────────┐
│            B 600  M             │
├─────────────────────────────────┤
│                                 │
│         WATCHTYPE :             │
│                                 │
│         PENDULUM                │
│      ┌──────────────┐           │
│      │   MECHANIC   │           │
│      └──────────────┘           │
│                                 │
├─────────────────────────────────┤
│  SELECT  ACTUAL  RUN  PARAMETERS │
└─────────────────────────────────┘
```

In this menu
press  FREEZE

to display
the double beat.

press  START/STOP
to return to the main menu

DIAGRAM  DOUBLE  BEAT

PRESS  START/STOP KEY TO COMPLETE . . .

DIAGRAM SINGLE BEAT

PRESS  START/STOP KEY TO COMPLETE . . .
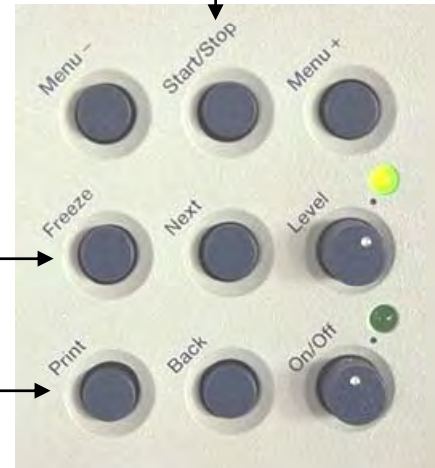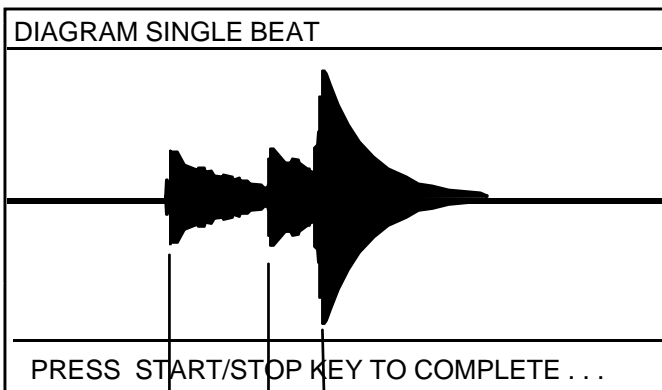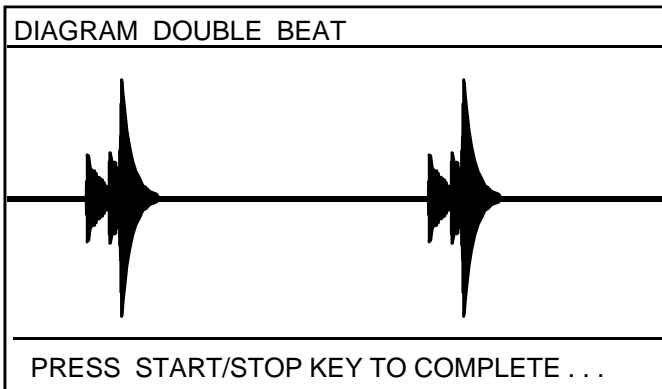
For more ditails.

press  PRINT

to display the single beat.

press  START/STOP
to return to the main menu

A          B          C
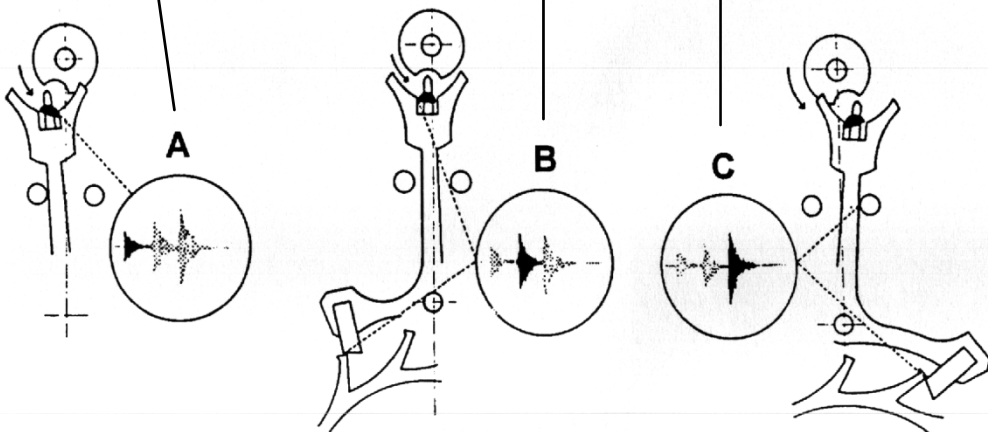
Escape system
of the watch.

## 2.0  CALCULATION OF AMPLITUDE

The Amplitude depends on the following :

1.  Beat per hour of  the watch
2.  Lift angle in degrees
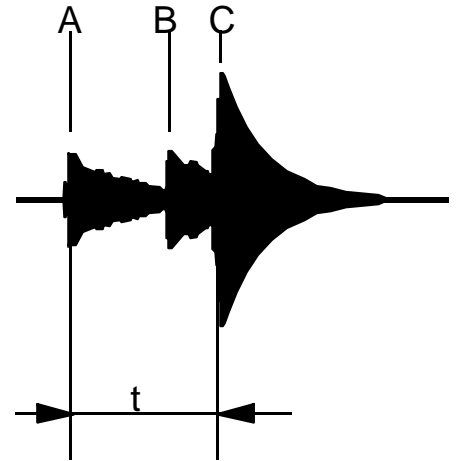3.  Time between  **A**  and  **C**   in seconds

Terms :

Amp =  Amplitude of balance wheel in °

⊿   =  Lift angle in °   ( most watches have 52 ° )

t    =  Time between  A  and  C   ( in seconds )

n    =  Beat of the watch ( per hour )

**Formula :**     **Amp =  $\dfrac{(3600 * ⊿ )}{( t * pi * n )}$**

**Example :**

**lift angle =  52°**
**n        =  28800 beats / h**
**t         =   0.009 s**

| (3600 * 52 )              | = 187200 |
| (0.009 * 3.14 * 28800)   | = 813.89 |
| Amplitude                | = 230 ° |

Remark :       The value of the time ( t ) depends on the mechanical datas
               of escapement from the watch. This value is always measured
               by the B 600 and the amplitude is calculated.
               As you may see in the calculation example, this value is directly
               responsible for the result of amplitude.

Conclusion :   The B 600 can calculate and display the amplitude of a watch
               very exact and stable, if the escapement noise is clear and stable.
               as it is in figure ( 1 )
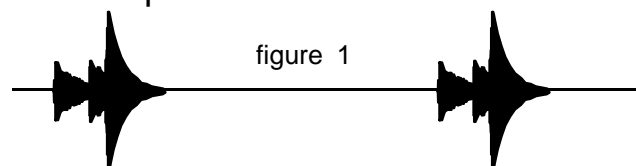
figure 1

But it's impossible with a escapement noise as you can see in
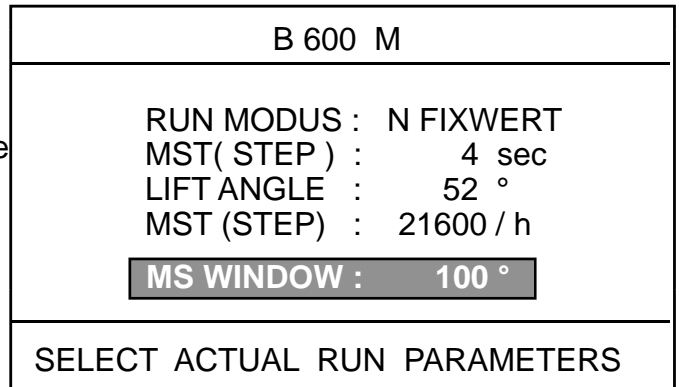figure  ( 2 )

figure 2
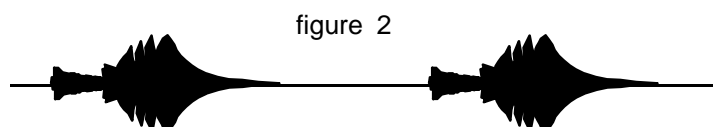
## 2.1  *MS WINDOW*   *( Measuring window )*

The measuring window  has a factory setting
value of 100 ° .

This means, the B 600 can display an amplitude
value higher than 100 °.

You may change this setting, if you have
problems with the amplitude of certain watches.

```
┌─────────────────────────────────────────┐
│              B 600  M                    │
├─────────────────────────────────────────┤
│                                          │
│   RUN MODUS :   N FIXWERT                │
│   MST( STEP ) :       4  sec             │
│   LIFT ANGLE  :       52  °              │
│   MST (STEP)  :   21600 / h              │
│  ▐ MS WINDOW :        100 °           ▌  │
├─────────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS        │
└─────────────────────────────────────────┘
```

If the escapment noise is not clear
(because of mechanical problems of the watch,
the noise signal may look as in figure 5 .

The value ( t ) is not always identically.

The B 600 may display a rong Amplitude ,
e.g   170 ° instead of  250°.

In this case you have the possibility to change
the value called ( MS WINDOW ).

The value ( MS WINDOW ) is the minimum amplitude
the B 600 can display.

If you increase the value to 220°, a real lower value
will not be displayed. The place where amplitude
normally is displayed, remains empty.
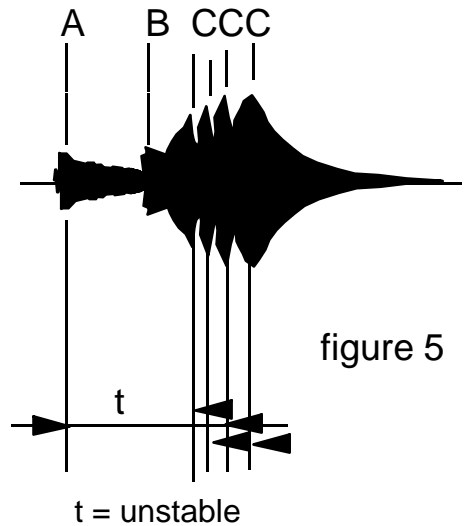
The MS WINDOW cuts a part of the escapment
noise signal.



figure 5

t = unstable

```
┌─────────────────────────────────────────┐
│              B 600  M                    │
├─────────────────────────────────────────┤
│                                          │
│   RUN MODUS :   AUTMATCL                 │
│   MST( STEP ) :       4  sec             │
│   LIFT ANGLE  :       52  °              │
│   N ( STEP )  :   21600 / h              │
│  ▐ MS WINDOW :        180 °           ▌  │
├─────────────────────────────────────────┤
│   SELECT  ACTUAL  RUN  PARAMETERS        │
└─────────────────────────────────────────┘
```
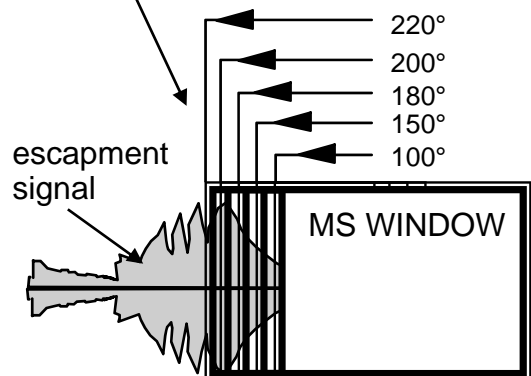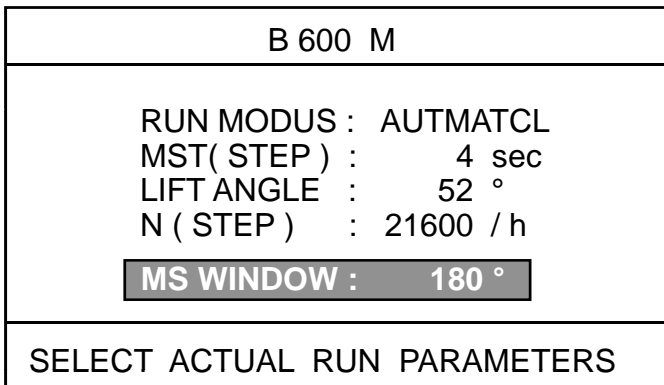


escapment
signal
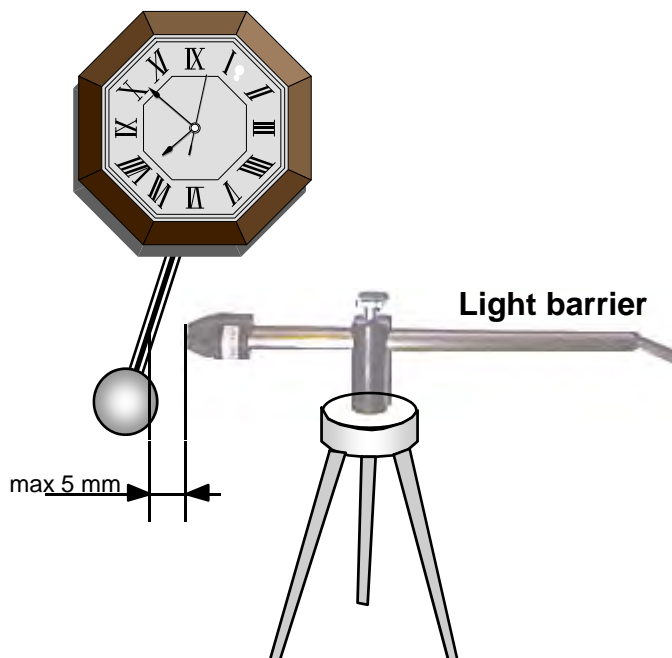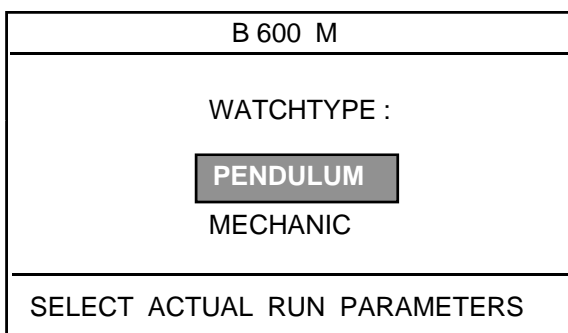
220°
200°
180°
150°
100°

MS WINDOW

figure 6

To save the new  value of MS WINDOW when in the above menu,
Press  ( PRINT ) first  and then  ( MENU - )

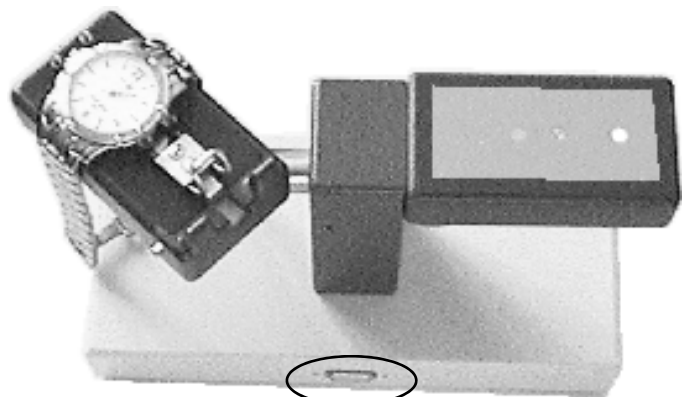### 3.0 Clocks can be  tested with a clamp microphone or a light barrier.

The clamp-microphone or the light barrier may be connected to the 15 pin male plug
on the rear of the  B 600 instead of  the MP86M. See also page 1

### 3.1 Testing Clocks with a light barrier.

a)  place the light barrier max 5 mm from
     the arm (pendulum).

b)  Switch the B 600 to PENDULUM
     pressing  (MENU -)

**Light barrier**

| B 600 M |
| --- |
| WATCHTYPE : |
| PENDULUM |
| MECHANIC |
| SELECT  ACTUAL  RUN  PARAMETERS |

max 5 mm

**Clamp - microphone  for pocket-watches and clocks.**

The clamp-microphone may be connected to the 15 pin male plug on the rear of the  B 600
instead of the MP86M.

**Light barrier for clocks.**

The light barrier may be connected to the 15 pin male plug on the rear of the  B 600
instead of the MP86M.

**MECHANIC**  N FIXED : 21600  LA: 52  MT: 2
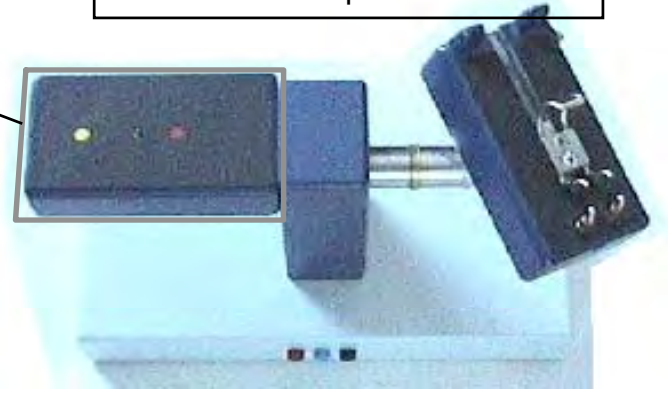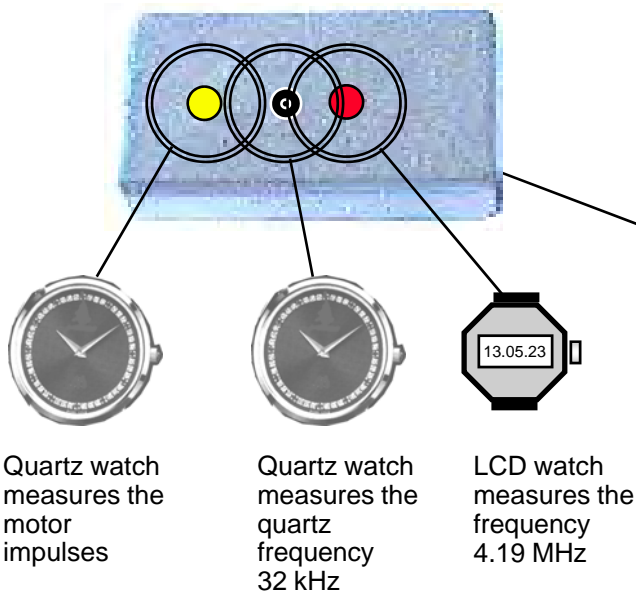26 s/d    218°    0,2 ms

## Microphone[QM

The QM4 has 2 microphones in one.
The shown left side has the same function
as the MP86M. For mechanical watches.
The shown right side is equipped with
3 capture systems:
red point    = capacitif  LCD (quartz 4,19MHz )
metal pin    =  microphone for quartz 32 KHz
yellow point=inductif capture of motor impulses



Connect here the cable between
B 600 and microphone.

13.05.23

Quartz watch
measures the
motor
impulses

Quartz watch
measures the
quartz
frequency
32 kHz

LCD watch
measures the
frequency
4.19 MHz

## *User Info about measuring of quartz watches*
## *On Vibrograf B600*

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**Explication of PRECISION**
**( Float )  or  (    /1 sec  )   or  (    / 10 sec )   or   (  / 100 sec )**


**Float =** The display of result on the left corner will be automatically
set depending of the precision of the watch.
e.g.   Result   is displayed   **( + 0.12 s/d )**
--------------------------------------------------------------------------------------------


| **( / 1 sec )** | **R esult is displayed** | **( + 0  s/d )** |
| **( / 10 sec)** | **Result is displayed** | **( + 0.1 s/d )** |
| **( / 100 sec )** | **Result is displayed** | **( + 0.12 s/d )** |

---

## Explication of  ( INDUCTIV  ) ( DSPFRCY)  ( TUNIFORK )

**Quartz Frequency measurement =** measures the frequency of the quartz
inside the watch. Lay the watch on the metal Pin. The microphone will display the
deviation of the Quartz frequency of the watch.

**INDUCTIV =**   Motor impulses measurement
Put the watch on the yellow point. Each motor impulse will be displayed with
A arrow in the lower part of the display.
For example quartz watches with 1 second impulses
Or quartz watches with inhibition of ( 10 sec. 20 sec. 60 sec. For example.)

**DSPFRQCY =** LCD  Frequency signal
For  the  measurement of Display ( LCD ) Signal measuring.
Only possible with standard LCD Display watches with a display frequency of  64
Hz.  Lay  the watch on the red point with the display downwards and
If possible at the same time make contact with the metal case of the watch with the
metal pin in the middle of the microphone. ( grounding )

**TUNIFORK =**   Tunifork watches ( antique style watches)
For example ( OMEGA  electronic f 300Hz ) Seamaster Chronometer
Put the watch on the yellow point.
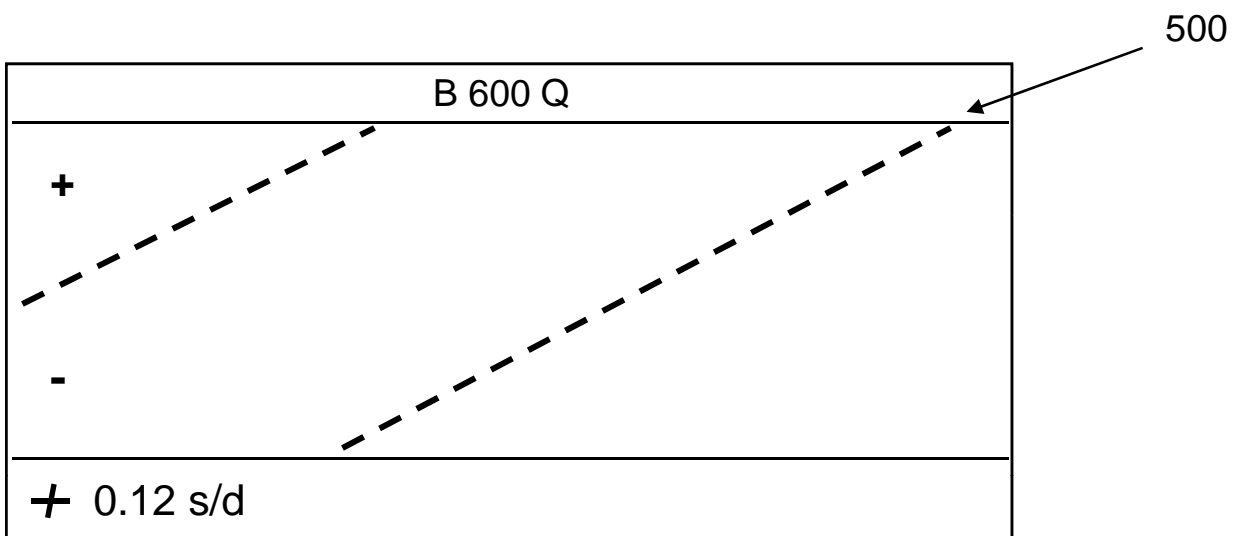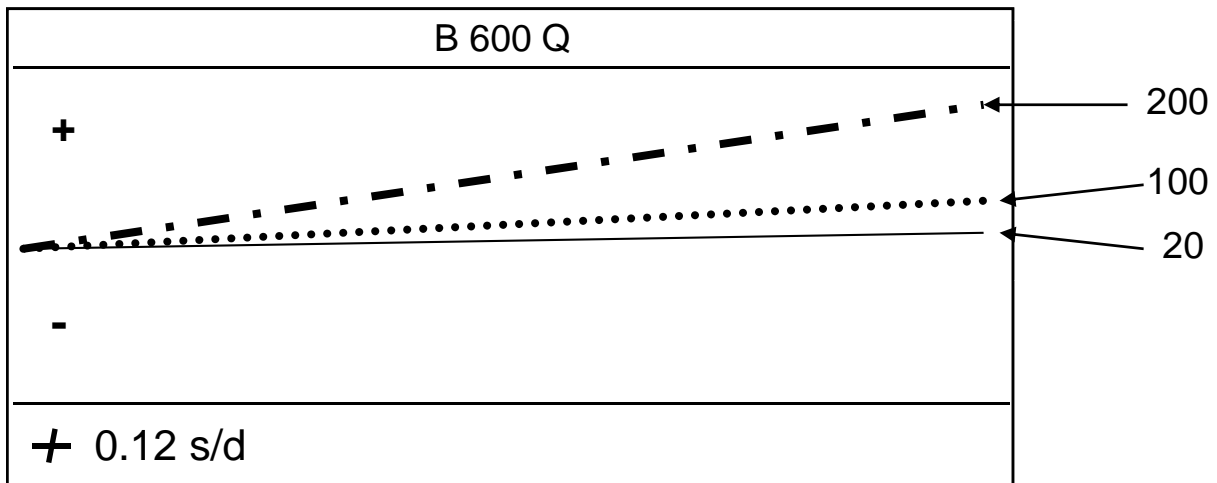Preferably  choose a measuring time of min. 8 sec. ( stability of result )
And  the (DSP Y Gain to 20 )
By changing the ( DSP Y GAIN ) „Display gain „ the grafic line will change.
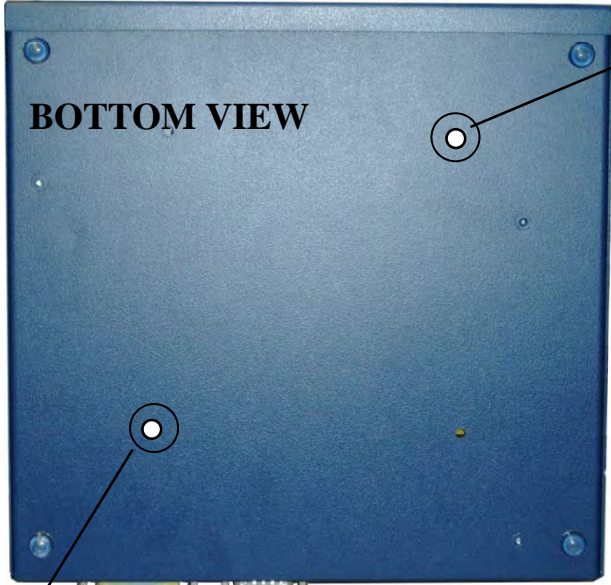Please try once

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**EXAMPLE for  ( DSP Y GAIN ) ( 1,2,5,10,20,50,100,200,500 )**
**Same watch  ( + 0.12 s/d )**

**The higher you set the (DSP Y GAIN) value ,**
**The higher is the resolution of the displayed grafic.**

B 600 Q

+

— 200

— 100

— 20

-

**+**  0.12 s/d

500

B 600 Q

+

-

**+**  0.12 s/d

# Calibrating and adjustment on your B600

**Front of B600**

BOTTOM VIEW

**Ajustment of brightness and contrast of B600 display.**

When it needs adjustment?
Depending on where you put the B600 and from which angle you are looking in the display it may be necessary to adjust the contrast .
How to adjust?
Switch on the B600,.
Turn the potentiometer in either c.w. or c.c.w. direction while you watch the changement of the display brightness and contrast.

**Rear of B600**

**Amplifier for the signal of the microphone**
**When it needs adjustment?**

If you have the impression that the watch signal is too weak and the grafic gives problems.
**How to adjust?**
Turn the Knob ( Level) in front of the B600 in the position one o'clock ( point to point )
Lay a good working watch correctly on the microphone.
On the B600 press the Freeze button and watch the Oscilloscope signal of the watch noise.
Turn the Pot meter on the bottom of the B600 slightly in one direction.
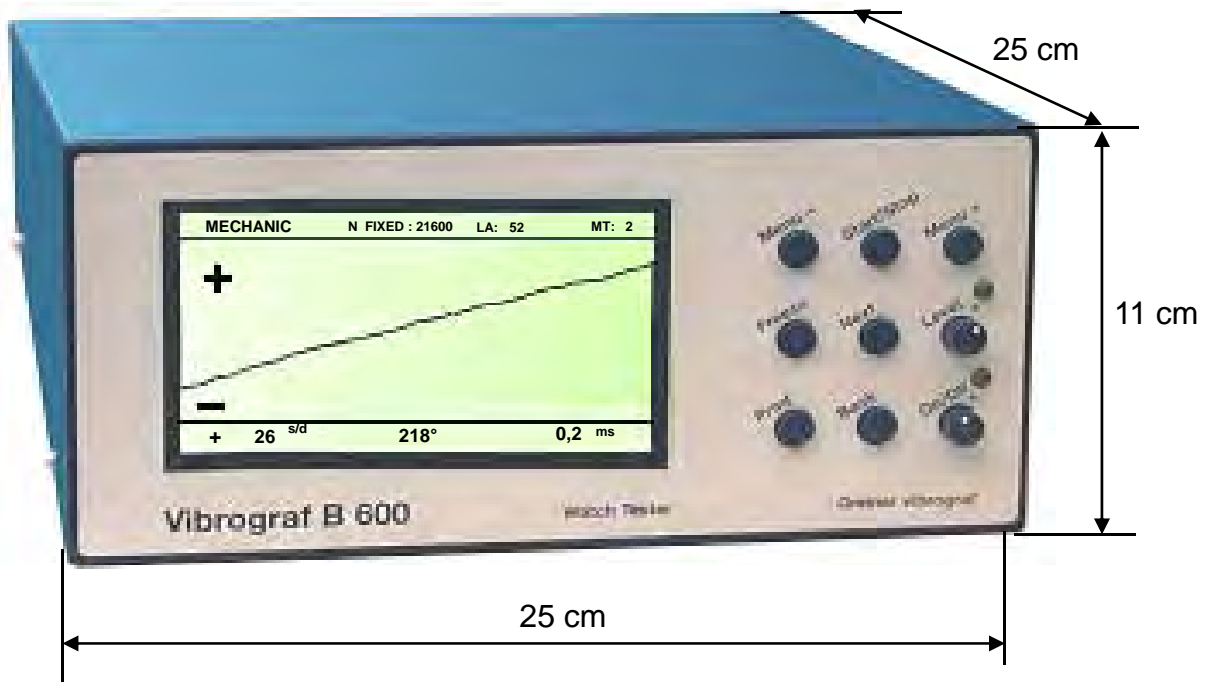The oscilloscope signal should touch the upper and lower line. O.K. that's all
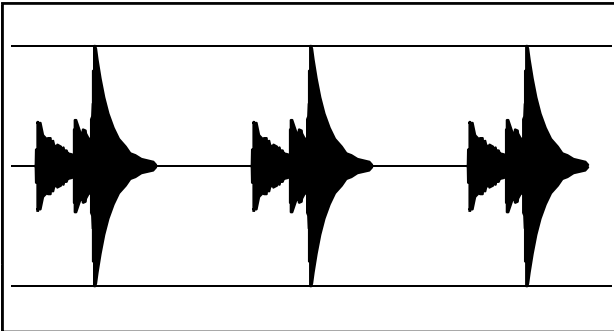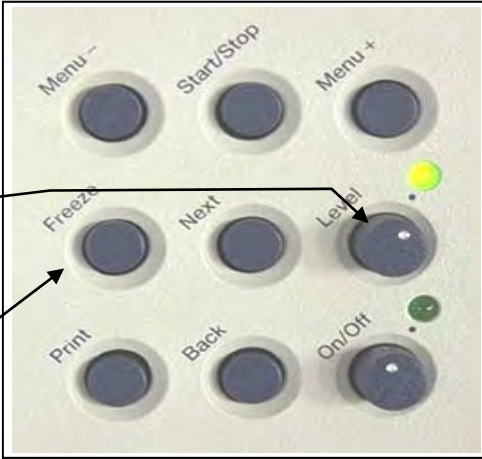
**Adjustment of internal quarz frequency**
The calibration is reserved for service only

With this potentiometer the B600 can be calibrated .
This means , the internal quarz frequency will be adjusted.
To calibrate the instrument correctly ,you neet a master signal , e.g. DCF77.
The calibration is reserved for service only

**Operating - Manual B 600 M / Q**

weight = 3.0 kg

25 cm

11 cm

MECHANIC    N FIXED : 21600    LA: 52    MT: 2

+

−

+    26 $^{s/d}$    218°    0,2 $^{ms}$

Vibrograf B 600    Watch Tester    Greiner Vibrograf

25 cm

| | |
|---|---|
| Power suply : | 230 V , 50/ 60 Hz |
| | 115 V , 50/ 60 Hz   (adjustable inside) |
| | |
| Power consumption: | < 20  W |
| | |
| Time base: | TCXO - Reference-oscillator |
| Precision: | 1 ppm ( < 0.1 s/day) |
| | |
| Conections: | Power supply plug |
| | plug for microphone |
| | serrial plug ( not active) |
| | paralell printer connector |
| | |
| Display: | 1 LCD Display, adjustment of brightness |
| | with potentiometer on the rear |
| Functional sequence: | 2 LED's, printing and measuring |
| | |
| Measuring possibilities: | mecanical watches: |
| | beat frequency (automatic and manual) |
| | out of beat value |
| | amplitude |
| | time deviation |
| | visualisation on display of beat noise |
| | electrical watches |
| | 32 kHz quartz frequency |
| | 4.19 MHz  quartz frequency |
| | frequency of digital display |
| | motor impulses |
| | |
| Optional devices: | clamp microphone |
| | optical system for clocks |