

MTG-9900A
MTG-9900
TIMEGRAPHER

INSTRUCTION MANUAL

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Thank you for purchasing MTG9900A (or MTG9900) timegrapher. MTG9900A is a new generation timegrapher with top configuration and optimal performance developed by Beijing TYMC Technology Center for high-end market. The device is equipped with digital colored LCD touch screen, automatic microphone and mini heat sensitive printer. MTG9900 is the basic model in this series, it is equipped with a normal microphone. Their other configurations and functions are the same, except the MTG9900 does not have the function of rate/amplitude monitoring, so the following description is suitable for both.

I. Characteristics of Instrument

Apart from the display of diagram of beat noises and numerical display of rate, amplitude and beat error those normal timegraphers possess, this instrument has the following characteristics:

1. Because the resolution of LCD display is up to 800x640, the display of diagrams and words is neat and clean and much more information can be displayed on the screen. The maximum display of diagram can reach up to 1600 dots on one screen. The corresponding test time is 4 minutes 26 seconds for the watch its beat number is 21600b/h and 3 minutes 20 seconds for 28800b/h.

2. Touch screen operation is convenient and fast; the device only has a reset key for restarting in specific situations.

3. There are three diagram display modes: horizontal high definition, horizontal thickened and vertical high definition, the operator can choose the one that fits him.

4. The programming test program is convenient and practical, and is not only applied to watch factories but also for repair shops.

5. The rate/amplitude monitoring program is perfect. It is an effective way to analyze watch qualities. (Not for MTG9900)

6. The device can test normal watches and coaxial watches, and their lift angle can be set respectively and can be switched for ease use.

This instrument is rich in functions, please read the instruction manual carefully so that the operator becomes more skillful in mastering the device.

II. Technical Specifications:

Technical specifications of the instrument are as follow:

▲ Measuring range and precision of numerical results:

Rate: $-300\text{s/day} \sim +300\text{s/day}$, precision: $\pm 1\text{s/day}$

Amplitude: $90^\circ \sim 350^\circ$, precision: $\pm 3^\circ$

Beat error: $0 \sim 4\text{ms}$, precision: $\pm 0.1\text{ms}$

▲ Beat numbers: 12000, 14400, 18000, 19800, 21600, 25200, 28800 and 36000 b/h, it can be selected automatically or manually..

▲ Test positions: 1~6

▲ Lift angle: $20^\circ \sim 70^\circ$

▲ Stability of time base: $\pm 0.1\text{s/day}$

▲ Input voltage: AC 100~240v

III. Configuration of Instrument

The timegrapher consists of main machine, automatic microphone and printer. The main machine contains the processing and control unit, LCD display and DC power supply. Automatic microphone has indexing mechanism, driving and control circuit board, as well as TYAPS watch signal processing module.

MTG-9900 only equips normal microphone.

IV. Testing Selection and Parameters Set-up:

After switching on the tester, the homepage will display in 3 seconds. All selections and settings can be set on this page.

All rectangles on the page are touch keys; you can touch it with stylus or perpendicularly with your fingertip (more reliable with stylus). When you touch the item and it turns red, it means you selected this item. The items that can be set are as follow:

1. Selecting the beat number: There are 8 fixed beat numbers that can be set by touching corresponding keys. Also automatic selecting can be chosen, and usually this is the better option.

2. Setting-up the lift angle: The range of lift angle is $20^{\circ} \sim 70^{\circ}$. The median value of lift angle for normal watch movement is about 52° , and for coaxial watch movement is about 38° , so device leaves the default values are 52° for normal watch and 38° for coaxial watch. If the lift angles are requested for re-setting, then you should set the lift angles respectively. Enter the page of "LIFT ANGLE SETTING", input the lift angle value, operate according to prompt.

3. Selecting normal watch movement or coaxial watch movement so that the lift angle is adopted correctly.

4. Selecting the display mode of diagram in normal test.

5. Setting-up of date and time: enter "TIME SETTING" page, and then follow the instruction. Although only hour, minute, second display on screen, you should set up year, month, date correctly, because during "rate/amplitude monitoring" these data should be recorded.

6. Open or close the loudspeaker.

7. Adjusting of LCD screen brightness, there are three grades.

Attention, all selections and setting-up only can be done on the homepage and stored automatically; they will be kept even restarting the machine. If you want to change the items, you must return to homepage. But the selection of the type of watch movement is an exception: it will always keep default as normal watch movement when start device on. In addition, the brightness keeps as brightest when start on.

V. Normal Testing

After selection of display mode of diagram, touch "normal test" key, then the device begins testing.

The diagram of beat noises is continuously displayed and three display modes of diagram have distinctive features.

In “horizontal high definition”(HORIZ. HD) mode, the displayed diagram length is the maximum so that you can observe the watch’s running condition for relatively long time. In “ horizontal thickened” (HORIZ THICKENED) mode, the dots are larger, so it is easy to observe but only 400 dots can be displayed on a screen. “Vertical high definition” (VERTICAL HD) mode is suitable for the operators who are used to observe vertical diagram. When the diagram display is horizontal, then it can be switched between “high definition” and “thickened”.

All display modes use “ pushing” mode, the displayed dots move right or down every beat and the new dot is always on the leftmost or uppermost section of the screen. The diagram made up of dots is one or two lines. The slope of the lines represents the value of rate deviation and their trend represents positive or negative deviation . The interval between two lines represents beat error. For the watches they have same rate and beat error but with different beat number, their slopes and intervals of the lines may be different. So the values displayed on screen shall prevail.

There are numerical values display of rate, amplitude and beat error on the screen, also there are several rate values (small words) corresponding the diagram displayed on its upward side or leftward side. These values display will advance with the advance of diagram. It is called “multipoint display of rate”, and is easy to observe how they change over time.

The digital value of rate_average is 48 beats, equal to 8 seconds for the watch whose beat number is 21600 b/h and 6 seconds for 28800 b/h , while the values of the beat error and amplitude is averages of 8 beats and 16 beats respectively. These three values appear on the screen for the first time at different times and will be updated every 12 beats. If the displayed values are out of the limits, or the diagram is in disorder the results cannot be found, then there will be a blank in the displayed place.

TYAPS watch signal processing module equipped in this device has very strong AGC function, so the adjustment of signal level is not necessary in the test procedure. But automatic microphone still leaves room to better accommodate the test in a special testing environment or special watch. There is a small switch on the back of microphone and two levels can be selected. Usually it is put on low level, but if the watch signal is too weak then it can be put on high level temporarily. For normal microphone there are three levels that can be selected, it is put on middle level automatically when the device is turned on.

During the test, touch "PRINTING" to enter the page of printing selection, you can select diagram printing or combined printing. When combined printing is selected, the printer will print diagram and the numerical values of rate and amplitude once every 96 beats. After printing the device will return back to test automatically. In the procedure of printing, touching the "RETURN" key will suspend printing and the device will return to test. The diagrams for displaying and printing are the same, but for diagram printing the line width is unique for all modes, so if diagram has segments, then segmentations will have little bit different.

During the test the "PAUSE" key can be touched at any time, then the test will stop and the diagram will be frozen. Touch "RETURN" key, the device will return back to test.

VI Programmed Testing

Touch "PROGRAMMING TEST" key on the homepage the device will enter the programming testing.

First select test positions, test time and stabilization time after position change, then the test will go on automatically in each position in order (MTG-9900 Timegrapher needs rotation by hand). The diagrams in each position are displayed on corresponding zones, for each test position the maximum diagram length is 480 dots, and the test time is 80 seconds for 21600b/h and is 60 seconds for 28800 b/h. It can completely be used to test luxury watches, like tourbillon watch.

After testing, the multiple test results will be displayed. They are rates, amplitudes and beat errors, as well as maximal rate difference and maximal amplitude difference among all positions. These data and diagrams in all positions can be printed out by touching corresponding keys. You can touch the "diagram display" key to re-display the diagrams.

During testing, the "CHANGE POSITION" key can be touched at any time, which will interrupt or skip the test in this position and change to next position, but reserve all data that was obtained from measured parts. This provides an option to reduce the test time.

Programming test is very suitable for the watch inspection in maintenance departments and manufactory.

VII Rate/Amplitude Monitoring

This is a specific function to MTG-9900A and suitable for the watch quality analysis and the test for luxury watches or the watches that have special problems. The function can display the test results for a long time, up to 100 hours. During test the changing curves of rate and amplitude will be displayed that reflects the watch's running condition more comprehensively.

The function include the following operations: programming, monitoring, displaying, storing and stored data displaying, etc.

Programming is asked for first use or changing conditions. Touch "RE-PROGRAM" key at start page of monitoring to enter program. Programming has three steps. First select the position, then select monitoring period, namely, the interval times. You can select 1,6,12,30 seconds or 1,3,5,10 minutes. The last is to select the duration. Every monitoring period has its corresponding maximum duration that is displayed by red words. If the setting time exceeds the maximum duration the monitoring will test complying with maximum duration without regard to excess part. Operator can write 6 programs maximum, after one program completed, operator can chose "FINISH" or "NEXT". 7

Monitoring can go on after completing programs. There are coordinate axis X and Y on screen during monitoring. X is the time coordinate axis and under it there are two rows of numbers of time: second/minute or minute/hour. Y is the values of rate and amplitude. On the upper left of screen, rate and amplitude are displayed in real time during monitoring. At the same time, white dots and red dots represent rate and amplitude are displayed according to the monitoring period so that two variation curves will be drawn, that is, an isochronism curve. When the time of monitoring reaches the time of duration the test will finish automatically and change to next program. After all the monitoring programs are completed the screen will enter into the page of displaying and storing selection.

Operator can touch "RETURN" key to end monitoring test in advance, but measured data are still saved.

On the page of displaying and storing selection all keys displayed by red words means measured data is stored here and can be touched, touching other keys will be invalid. Rate values will display first when opening the data display page and can be converted to amplitude displaying and curve displaying. When the curve length exceeds 320 dots the data will be displayed on two pages and can be switched over between two pages. After entering curve displaying it cannot return to data displaying, if you want to display data again you should return and reselect. On above page curve displaying can be entered directly.

Measured data will be cleared when you exit the program. If you want to keep the data long-term, storage is necessary. The device can store measured data 24 times (one time for one program). The data are stored starting from first storage area for a new device. When the last storage area is full, next data are stored again in first storage area and the original data will be covered. Storage will be going on when touching the corresponding key. At the same time of storing data the date and the time at the beginning of monitoring are also stored. Touch upper left 8

corner of screen at homepage (screen flashes), the original stored data can be cleared, then new storing in first storage area begins again.

On the start page of monitoring operator can touch the key to enter storage displaying. All keys that have date and time meant here store measured data and can be displayed by touching. The displaying is the same as data display above-mentioned. Also the display can be converted between rate display and amplitude display, at the same time these data can be used to draw curve.

The above isochronism curve reflects the running condition of the watch for a long time, so that it is possible to clearly understand the complete process from watch full winding to half winding and to stop. At the same time, you can find some periodic change rule to understand the working condition of escapement mechanism and gear train. 24 hours rate/amplitude monitoring for watch has special meaning, at that time, monitoring test will be going on for 3 minutes monitoring period and 24 hours duration ..

VIII Automatic Microphone

This device is equipped with AUTOMIC-3 automatic microphone. It can be both manually rotated by pressing buttons or by hand, and can be automatically rotated by the program.

In order to avoid the microphone rotating out of order, please pay attention to the sequence of power switches of main machine and microphone. The switch of microphone should be opened later and closed earlier. Alternatively, both power lines can be plugged into a power strip to be turned on/off simultaneously.

IX Trouble Shooting

1.The screen is not bright when the tester turns on:

Power supply may be damaged. The tester needs to be sent back for maintenance.

2.The word display on screen is in order but there is no display of diagrams and the values of rates, etc., or only messes of dots appear on the screen:

Usually the microphone is faulty. Please check the microphone. If possible, try again with a new microphone in order to determine if the microphone is broken, then send microphone or total set of device back and maintain.

3.The display on screen is not normal; bright streaks, messes of dots or irregular figures appear:

LCD screen or LCD controller damaged, please send back for exchange.

4.The slope of displayed diagram is abnormal and there is no rate display:

The beat number selection is wrong, return and re- select

5. The touch screen malfunctions or errors appear frequently:

please calibrate it according to the method mentioned as following.

Annex: Calibration Method of touch Screen

At the same time as the device turns on touch any position on screen continuously, after 3 seconds will enter calibration page. There are 5 circles on the page. Touch a center, and after the data is stable touch another center. After touching all the 5 centers touch the solid circle on the middle-lower part of the figure, the calibration is completed. The centers can be touched repeatedly and the last touch is saved.

The touch screen has a self-checking function. On the rare occasion that the relevant data stored is lost the device will enter calibration page automatically.

If the device cannot enter calibration page after above-mentioned procedure, it is likely that the touch screen has been damaged and will need to be sent back for maintenance.