



THE TACHOGRAPH – GENERAL DESCRIPTION

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Abstract:

The tachograph is a device fitted to the motor vehicles which make a recording on a paper chart of the speeds traveled and the distances driven, together with the detailed of the driver’s period of work and rest. It is most widely used in the countries of the European Union, where it is a requirement in the most largest goods and passengers carrying vehicles.

Keywords: tachograph, forensic, chart, vehicles, fraudulent.

Tachographic data have two majors applications in forensic sciences:

1. In investigation of the road accident
 - a. To determine the speed of the vehicle immediately, before and after the crash committed;

- b. To determine the rate of braking and driving mode.

2. In criminal investigation
 - To determine the route followed and the time when the vehicles was in a certain location.

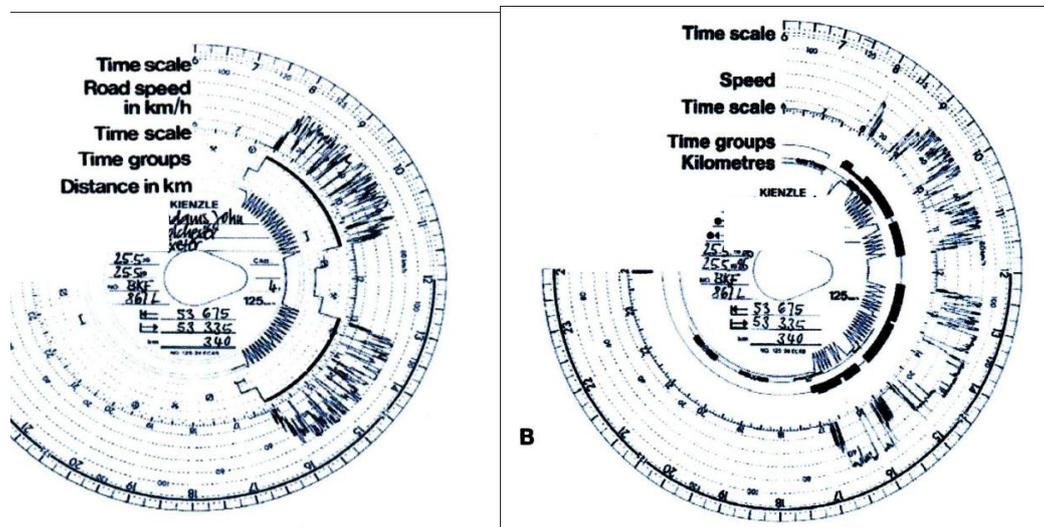


Fig. 1. Tachograph diagram who show the information using manual recording of time (A), or automatic (B).

Figure 1.A and 1.B illustrates typical tachograph charts and shows the information provided by the device. The

shape and design are not specified by EU regulations but the model diagram shown in this article became an industry standard.

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There are other models, but the devices they use are outdated.

The chart is a disc (123mm in diameter) covered with a material that is blank under pressure. In the center is an area where the driver writes his name, starting and ending locations of the driving day, date, vehicle number and mileage data. A gradation of 24 hours are marked on the chart edges and inside it. Among them is the field where speed is recorded, usually with a maximum of 125 km/h/1. More inside way of working is the field where the driver indicates whether *sofeaza*, is engaged in other tasks or resting. Highlighting is done by the band that recorded the cursor line runs (Fig. 1) or by

line thickness (Fig.1b). Sometimes it is possible to extract useful information from line working mode when the vehicle moved very slowly.

Recording is the closest distance from the center, indicated by a zigzag line. After you have completed 5 km there is an oblique line, indicating a complete V 10 km of movement, while the other distances will create partial lines.

All current models of appliances tachograph combine their own function with the speedometer, and are also designed to be mounted on board vehicles.

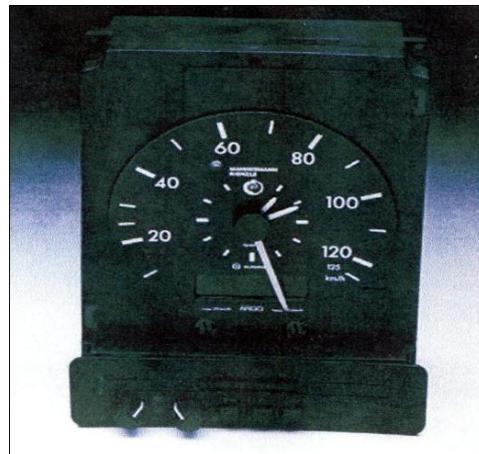
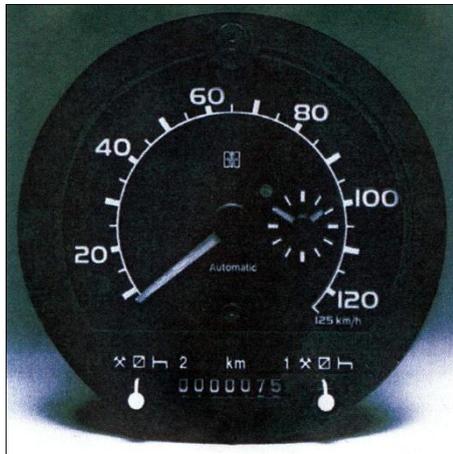


Fig. 2 and 3 illustrate two modern instruments indicating a clock speed and an odometer, a clock and buttons along with the driver and his colleague can register mode. (Most appliances recorded two diagrams where vehicle is driven by a team of two persons).

The majority of digital chart behind the outer face which can be opened downward to allow insertion and removal of it. Figure 4 shows a device opened with a diagram. The axis being at the place that is mounted chart rotates completely once

every 24 hours. When the unit is closed, the chart supports three pens that moves up and down to run *inregistrarea* (the recording).

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The axis and are oval hole in the center of the diagram to ensure correct

orientation of the chart in relation to time.



Fig. 4.

The device in Fig. 3 the charts are introduced two notches at the base, where they are automatically placed in pens that records data.

and 1111. Electronic models receive a series of pulses from a transducer in the gearbox, whose frequency changes in speed. There are many models such as: Motometer EGK 100, Jaeger G.50 and G.51, Kienzle 1314.1318 and 1319, Veeder Root 1400.8300 and 8400.

Tachographs can operate mechanical or electronical. On the mechanical tachograph, the rotating cable car gearbox put in place a system based on magnets and cupping are now outdated. Specific models are Kienzle Veeder Root in 1311

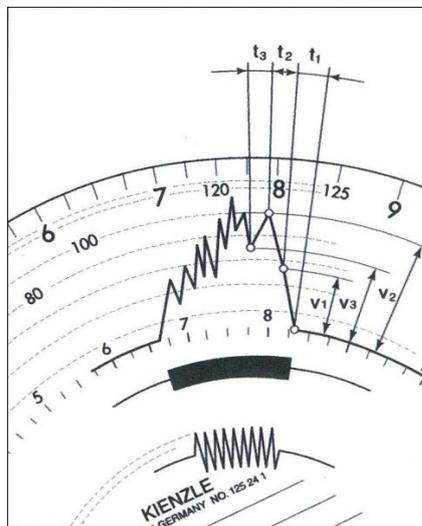


Fig. 5.

Fig. 5 shows a schematic marks from tachograph lines measured in an analysis. Follow the speed is considered as a series of points connected by straight lines. The

speed in each point is measured (v_1 , v_2 , v_3), as are also the intervals between them (t_1 , t_2 , t_3). That gives us an element of speed over a period of time, which can be

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integrated to produce a graph of speed on distance. There are plenty of options for making these measurements. Taking the speed of the chart is quite easy and can be done using increasing by shooting or a microscope. You have to make some approximations for accuracy gear or

tolerant recorded. Measurement of the time is not that easy. As the chart rotates only once every 24 hours, one minute take only 0.25 degrees and rotates in a second just 15 seconds. It is an usual spring assembly diagram under a microscope on a turntable which is rotated by a micrometer.

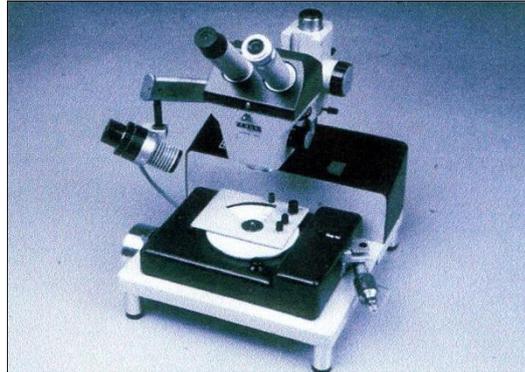


Fig. 6.

Fig. 6 shows a microscope such VDO Kienzle product. A glass plate etched with a line cursor vertically, with 3 mm, width is above diagram, and this is combined with a horizontal line in an eye to form an intersection in the visual field. Points for measurement are brought successively under intersection lines and movement diagrams by turning their front or back, these two movements transducers attached to them. Signals from transducers, which are interpreted as time and speed are transmitted to a microcomputer, where listings of these data and charts for speed and distance are generated. It's important to recognize if, when measurement intervals, the line along which the pen register data moved, is unlikely to be

passed through the center of rotation when mounted on a microscope diagram or tachograph, the geometric center of the diagram. If the cursor is not positioned vertically so that it sits along the line that moved the pen recorder, any time measured between points at different speeds will be wrong. If VDO Kienzle microscope, after glass plate containing the cursor can be rotated around its axis on the outer edge of the chart, this adjustment is used to place the result in what analysts correct position.

Most tachographs produced prior to 1 May 2006 were of the analogue type. Later analogue tachograph head models are of a modular design, enabling the head to fit into a standard DIN slot in the vehicle









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dashboard. This would enable a relatively easy upgrade to the forthcoming digital models, that were manufactured to the same physical dimensions.

The analogue tachograph head uses styli to trace lines on a wax coated paper disc that rotates throughout the day, where one rotation encompasses a 24-hour period. If the disc is left in the head over 24 hours, a second trace will be written onto the first, and so on until the disc is removed. It is an infringement of EU Regulation 561/2006 to use a disc for a period longer than it is designed for. Multiple overlapping traces may still be deciphered in the speed and distance fields, but it is far more difficult for the activity field where one trace can easily be obliterated by another. Analogue tachograph heads provide no indication to the driver of the need to change the disc. Analogue data is retrieved visually, and

can be assisted by manual analysis tools. Analogue discs can also be electronically scanned and analysed by computer, although this analogue to digital conversion process still requires human expert interpretation for best results, due to imperfections in the source disc such as dirt and scratch marks in the wax surface that can be incorrectly read as trace marks.

Article focuses on the tool as presented to EU regulations, while the principles of chart analysis and use of tachograph data are applicable to all types of vehicles.

In any case one that uses data from the tachograph must be aware of the particular device from which to appreciate the amount of information available and its limitations. This model range is vast and new tools appear over time, so it may not treat the details of each device can be met in practice.

References:

1. Siegel – Knupfer – Saukko, “Encyclopedia of Forensic Sciences”, Academic Press, New York 2000, pg. 48 – 62.
2. EU Regulation 561/2006 is the current regulation concerning the driving times, breaks and rest periods required to be taken by drivers of goods or

passenger vehicles who drive in the EU.

3. en.wikipedia.org/wiki/Tachograph
4. http://ec.europa.eu/transport/modes/road/social_provisions/tachograph/
5. <http://www.thefreedictionary.com/tachograph>

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