# TIME MEASURING INSTRUMENTS IN MEDIEVAL BRAŞOV – TECHNICAL, SOCIAL AND HISTORICAL ASPECTS

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The paper presents briefly some evolutionary aspects of distinct time measuring techniques throughout the development of human society, while emphasising the way the passing of time is marked in historical Braşov by the tower clocks of the main architectural and cult buildings that existed or still exist here. The paper reveals specific data by making reference to the evolution of the Council House Tower Clock since its origin and up to present days, undertaking various historical sources. A special role is held by the original aspects relevant to the present tower clock as regards its structure and evolution beginning with 1877 and up to present days, illustrating it together with its component parts.

Constantin Noica, the 20th century Romanian philosopher, defined the time as "the monotony of One that tends to multitude…And the humans, instead of taking any opportunity to accelerate into Kairotic, are immersing into chronology, destiny, entropy."

From an early age humans have understood their dependency on the environment, as human beings, as biological mechanisms (bound to breathe, to eat, to guide against unfavourable temperatures) and as part in the social life (being forced, as reapers, to know the areas rich in fruit, and as hunters how to follow the areas and periods wild animals and birds are moving about) [3].

In time the humans have learnt that they are dependant on an irreversible "flow" of the phenomena that give their existence a perishable status, a "transient" character; therefore it is the humans that strove for a rational understanding of time by measuring its "flow".

By contemplating the sky, the humans have noticed the (apparent) motion of the stars in the sky; the stars looked like they were predestined to play the marks for measuring time.

The sun marked the time measuring unit, the day.

The totalization of days, meant to constitute superior time quanta, was made easier due to the fact that the Moon, the second planet as far as the (apparent) size in the sky was concerned, periodically changed its appearance, making it possible to calculate the time interval (in days) between two successive lunations.

In ancient Egypt, beside the usual solar calendar, there persisted an older-fashioned moon calendar that was used to date the religious holidays.

A Sumerian from the 6th century might have taken great interest in the reality of cosmic flights, without being astonished. It was the extremely precise and "detailed" calculation of the time that would have certainly intrigued him. The battle with seconds would have seemed incomprehensible to him. It is not the spaceship that might have bewildered him but the clock might have! [13]

Ever since the 2nd millennium BC, the Chinese astronomers had been able to determine, even more correctly than the Arabs, the Egyptians or the Persians, the solstices, the equinoxes, the meridians and the poles.

More than five centuries before the first mechanical clock was brought to Europe, a scholar, Yi Xing and an engineer, Liang Ling-Zan, had conceived the regulator clock and created a water clock incorporating a water-driven escapement. It was the first "time machine" and it was as early as 725 AD. Starting from this invention, Su Song (Su Sung) designed a more complex and imposing astronomical clock at the Kaifeng imperial palace between 1088 and 1092. A huge water-driven wheel was automatically rotating the celestial globe, an armillary sphere and a gear system and levers were indicating the hour.

The design of a time measuring "machine" was, without any doubt, the strangest invention to have ever been made. The time was captured in the clock and, serving as a substitute for nature, the human being kept it under control.

The monks were the ones who developed clock manufacturing in Northern Italy, at the end of the 13th century, as they had to gather for prayers at precise intervals, both during the day and at night.

Most contemporary historians believe that not until 1300 did the mechanical clock come to light in Europe and "more than likely the clock was invented in Northern Italy", adds professor Carlo Cipolla, historian of economics at Berkeley University of California [13].

Other historians, even if a minority, move this date 100 years back, providing convincing arguments. In an almanac from the 13th century, Robert the English, a well-known mathematician and the inventor of a quadrant, writes about the horologe housed by Saint-Paul Cathedral in London, set up around the year 1286 and about the horologe in Canterbury set up in 1292, both constructed by Barthelemy, the clock-maker.

Not long after the 13th century the tower clocks came out and subsequently the clockmakers guilds were developed all around Europe.

Around 1450 tower clocks were assembled on the external walls of the towers. They were provided with a vertical hand at the ends of which there was rotating a circle marking the hours; at the end of 1400 it was noticed that it was easier for the hand to move on the graduated dial of the clock, which made it easier to tell the time.

A series of continuous improvements brought around 1675 increased the precision to measure time, subsequently it was time itself to be measured.

Beginning with the middle of the 17th century, the clocks began to have better precision; at earlier times they had but one hand and the dial was divided only in quarters.

Continuing the approach to tower clocks, the following lines are going to present a few of the historical monuments in Braşov and their tower clocks.

The information comes from prestigious sources in the field of historiography and bibliographic sources.

The oldest architectural monument preserved in Braşov is the imposing Bartolomeu Church (Fig. 1) which faces the Sprenghi hill and the construction of which began around 1223. The monument, surrounded by strong defence walls is conceived in the transition Romanesque style, with arched windows, ogival vaults, and decorative motives of gothic art. From the original construction the choir and the joined rooms were kept as well as the two ends of the transept arms. The tower that we can now see was set up in 1842, replacing the one that had crashed in 1833. In his travel notes, George Călinescu wrote: "The city of Braşov is first of all notable for the Black Church. Saint Bartolomeu is, from particular perspectives, even more impressing." [6]

Fig. 1. – Bartolomeu Church.

It is very interesting to notice that beside the four dials of the mechanical tower clock, on one of the church's walls a solar clock is drawn, dating from 1652 (Fig. 2).

Another monumental building situated in the very historical centre of Braşov is the Council House. Its "birth certificate" dates back to December 23, 1420 and nowadays it is to be found at the States Archives in Braşov (Fig. 3).

In 1515 the administrator of Braşov received 50 florins "in order to build the Council House tower". Later on, in 1520 it was mentioned that the windows of the

Council House tower had leather soaked with oil instead of glass and the repairing of the tower clock had cost 3 florins. This was the second tower clock in the city, after the one of the Black Church, mentioned in documents as early as 1514. The tower held a room specially designed for the tower guard [5].

Fig. 2. – The solar clock of the Bartolomeu Church, 1652.

Fig. 3. – The Council House.

In 1523, the tower clock was endowed with a copper case for striking the hours. In order to build the tower that very year 15,000 bricks were brought.

It is likely the clock broke after this date because, as related in Sextil Puşcariu's writings: "The tower clock for the repairing of which master Georgius the "hour maker" from Sighişoara worked for eight weeks and four days, stroke many times with its metallic voice. The clock's hands took the shape of an arm with the index pointing to the dial figure (Fig. 4 [11]). This might be the reason why the clock's hand was called *branca* in Braşov. In my days* the clock had a particularity I do not see to have dated from the days of master Georgius from Sighişoara (with the work of whom people of Braşov had been satisfied to such an extent that they voted a gratification and offered him a banquet that cost the fabulous amount of 2 florins). This particularity as compared to other clocks (of the Back Church and of the Catholic Church) was that it was always striking a different hour. In case you had to hasten to the train station and had to take a cab from the square – or at "quarter past three", as they used to say in Braşov – after all the effort to hurry the cab driver to get to the station in due time, you were surprised to notice that time had not passed at all as it was still a quarter past two at the time you got to the station. Clocks' nonconsonance was a general characteristics of the clocks around Braşov, especially of tower clocks housed in the Saxon churches of the Saxon villages." [7]

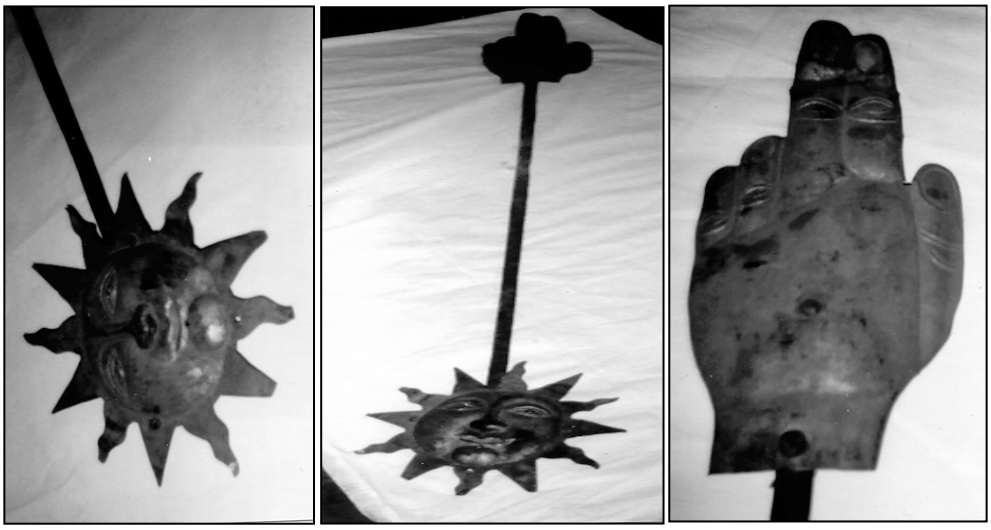

Fig. 4. – Clock hand dating back to Sextil Puscariu's times.

Sextil Puşcariu also wrote that "many people from Braşov were afraid of fire, especially those who had this unpleasant experience and for many years the night guards made rounds and with a trumpet they warned the people to blow out the

* (*i.e.*, 1877–1948).

candles and to put out the fires. ‘Gentlemen, it stroke nine, blow out the candle light and put out the fire’, they were psalmodizing in German…, the Council House guard made regular rounds in the tower gallery and in case he noticed flames or smoke, he tolled the bells. One toll repeated at intervals meant “fire in Braşovechi” (the German name began with A); two tolls were for Blumana, three for Scheii, four for the Fortress; five tolls announced a fire in Stupini. The horologe strike was different from the alarm bell.” The history of the tower horologe tells us that there were other types of hands, hour hands, and minute hands as shown in Fig. 5 [11].

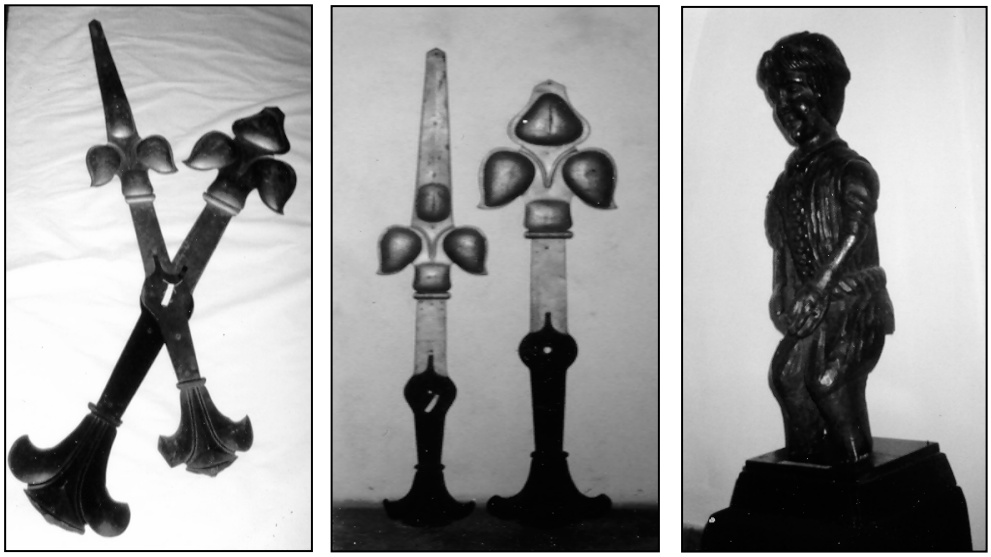

Fig. 5. – Other types of clock hands of the tower clock together with a wooden figurine that used to stike the hour in the Council House tower (seventeenth century).

According to historian Gernat Nussbächer, from Braşov [5], “on September 16 (1608), the ponderous globe was placed in the tower. The tower clock was then repaired and the tower was painted.

The Council House tower was also called “the tower of the trumpet players”, following the custom of other towns; the reason was that the tower guard blew the trumpet every hour.

During a powerful storm, in the afternoon of the 24th of July 1682, “the tower of the trumpet players” was struck by lightning again, but with no great damage. The notary public of that time in Braşov, Martin Seewald (1660–1721), praised the tower and the clock which displayed the hour on all its four sides, as one of the main city attractions at the end of the 17th century. On April 21 1689, an awful disaster fell upon Braşov: a terrible fire destroyed the greatest part of the “City” and of “Şchei”. In his novel, *Die Stadt im Ostem*, Adolf Messcherdörfer evoked the tragic event [1]: “Lashed by the storm, the blazes scented from

everywhere the core of the town; the beautiful merchant's house was shaking, the outstanding Council House with its precious horologe was tumbling down."

In May 1691, the building work of the Council House roof was initiated. A new clock striking the full hours on a bell was set up in the tower for the price of 200 florins (money got from fines). After each full hour a trumpet melody was played on the open gallery which surrounded the Council House tower at half its height.

The date of 21 April 1774, that is precisely 85 years after the great fire, date noted in the memorandum drawn up by G.M.G. von Herrmann and stored in the tower globe, marked the beginning of the restoration works of the Council House, works which lasted till 1778 [5].

On June 8, 1774, the repairing works of the Council House tower roof were begun, which lasted till October.

In October, the same year, the bell-founder Johann Wentzel cast a metal bell for striking the quarters of an hour; the bell cost 334 florins; in December, the clockmaker Matthias Riemer assembled the clock mechanism. The same craftsman made eight new hands [5].

The following year, from December till May, the Council House tower was plastered, and from July till September, the four dials "en Fresco" were painted "with great artistry" by the painter Joseph Moor.

"Wine was used to prepare mortar. Beside the year 1528, the year 1775 was also inscribed on the dials of the clock." [5]

In 1870, the air gas illumination was introduced into the Council House. From a description of the Council House drawn up in 1874, we find out that, in those days, the tower guard, who was living in the tower, made his rounds every quarter of an hour, stroke the tympanum at set times, announced the fires by tolling the bells and, at night time, pointed to blazes with a lamp.

Fig. 6. – Frontal view of the clock case.

Fig. 7. – Frontal view of the clock mechanism.

The present clock (Figs. 6, 7, 8, 9, 10) [11] (which seems to be the third or the fourth in the history of the Council House) is a weight-driven clock endowed with a pendulum and it dates back to 1877. The name of the clockmaker who manufactured it is also inscribed on the clock:“Jos. Both, Uhrmacher in Kronstadt 1877.”

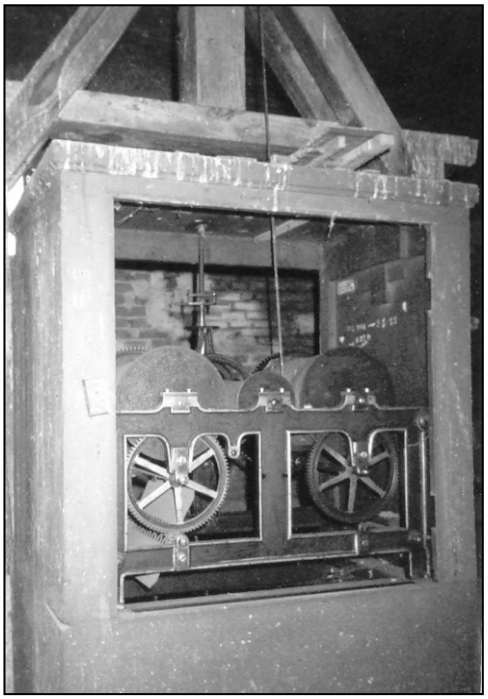

Fig. 8. – Backward view of the clock mechanism.

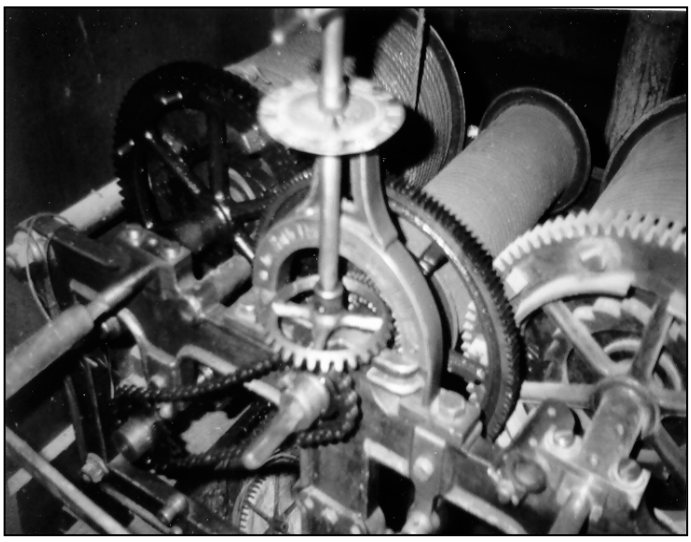

Fig. 9. – Upper part of the clock mechanism.

Fig. 10. – Mechanism with conical gear wheels driving the rotation movement to four directions (crossways).

The clock weight (Fig. 11) [11] descends 12 meters, with a descending speed of 1 m/day, which gives a 12-day functional autonomy, after which it is lifted in the upper position with a hoist, a component part of the clock, with the help of a handle (Fig. 7) [11].

Fig. 11. –The clock weight that drives its mechanism.

The pendulum was disassembled and only the wooden case in which it swung is now left (Fig. 12) [11]. The pendulum was replaced by an electromechanical mechanism (Fig. 13) [11] designed and upkept by engineer Zoltan Boer.

Fig. 12. – The pendulum case.

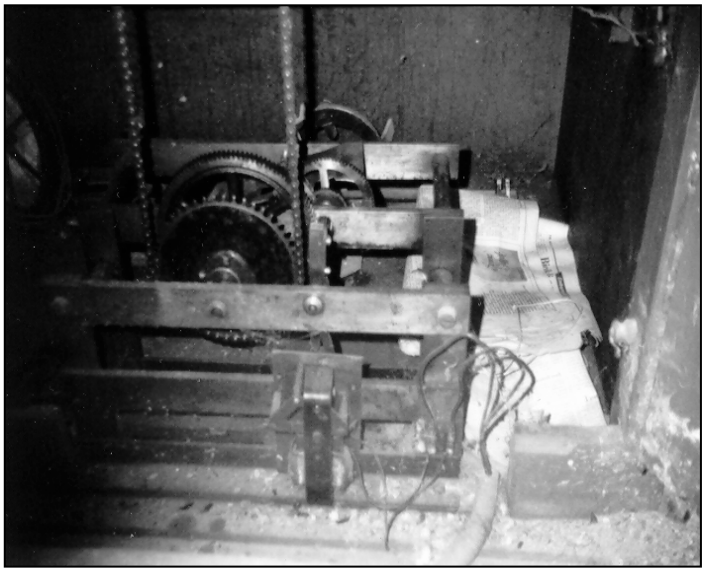

Fig. 13. –Electromechanical mechanism.

It is now worth mentioning that Mr. Zoltan Boer is in charge with repairing and upkeeping all the tower clocks that are to be found in the cultural institutions of Braşov.

It is also to be mentioned that the diameter of the four glass dials is of ~2.52 m, while the diameter of the internal disk, under which figures are painted, is of ~24 cm.

Every dial is illuminated at night time with two electrically-driven mini-reflectors (Fig. 14) [11].

Fig. 14. – Internal view of the clock dials.

Dial repainting, as we can see it nowadays, was completed after 1910, when the tower roof acquired the present shape, being known that before 1910 the tower had had an onion-shaped dome (Fig. 15) [12].


Fig. 15. – The Council House with its clock tower before 1910.

The internal dimensions of the tower which houses the entire mechanical system of the clock are of 5.3 m (the side) and the external dimensions are of 7.5 m (the side), resulting a tower walls thickness of 1.1 m [11].

Finally, another historical objective that often identifies with Braşov, the Black Church, was begun in 1385 and was finished in the last decades of the 15th century, that is in 1477, as can be noticed in an inscription on one of the wooden gates of the southern portal:

„ANNO 1477 – mo."

The church's tower houses a four-dial clock, as well.

It is mentioned that between 1506 and 1531, "great damages" caused by earthquakes were repaired. In 1514, locksmith Iohannes repaired the tower clock, in 1523 locksmith Erasmus continued his work, and in 1524 it was craftsman Georgius from Sighişoara, the same person who repaired the Council House tower clock in 1528 that continued the works [1]. The dials were repainted and have had the current form beginning with 1999 (Figs. 16, 17, 18) [12].

Fig. 16. – The clock in the Black Church tower; south-west view.

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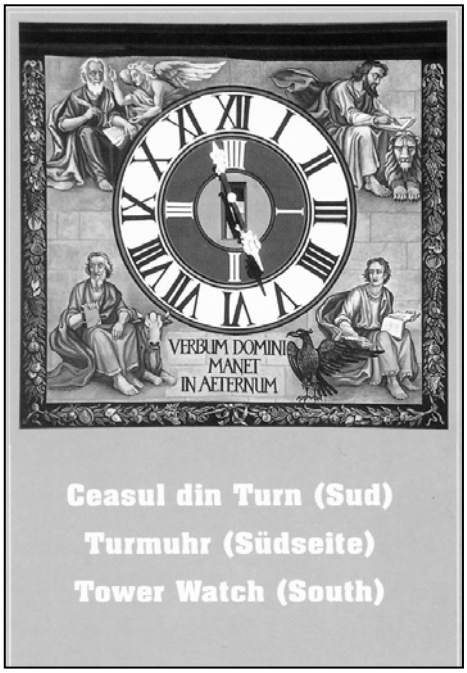


Fig. 17. –The clock in the Black Church tower; south view.


Fig. 18. – The clock in the Black Church tower; west view.

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