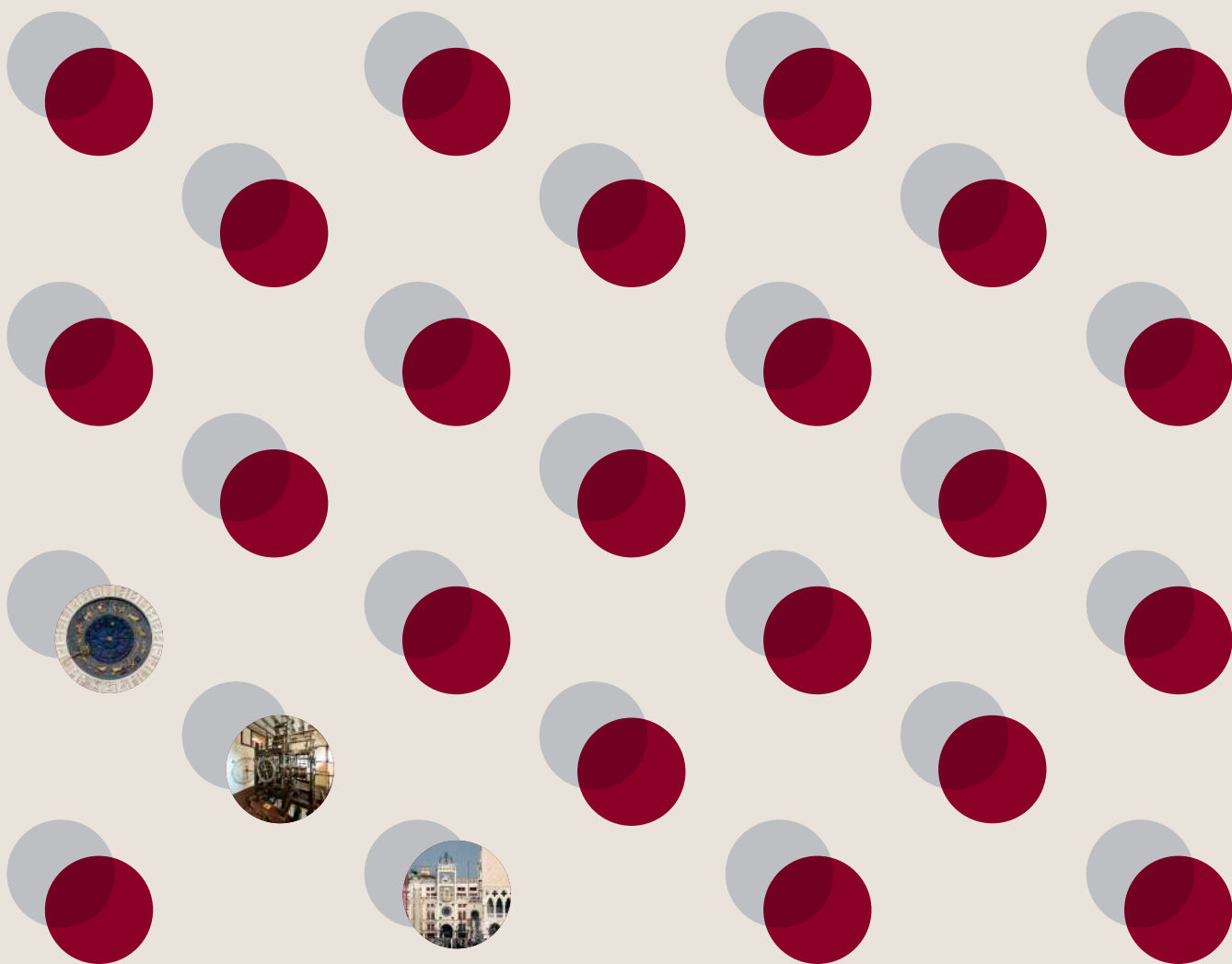


# Fondazione Musei Civici di Venezia

## The Clock Tower



# The Clock Tower

The Clock Tower is one of the most famous architectural landmarks in Venice, standing over an arch that leads into what is the main shopping street of the city, the old Merceria.

It marks both a juncture and a division between the various architectural components of St. Mark's Square, which was not only the seat of political and religious power but also a public space and an area of economic activity, a zone that looked out towards the sea and also played a functional role as a hub for the entire layout of the city. In short, the Tower and its large Astronomical Clock, a masterpiece of technology and engineering, form an essential part of the very image of Venice.



## THE HISTORY

As is known, the decision to erect a new public clock in the St. Mark's area to replace the inadequate, old clock of Sant'Alipio on the north-west corner of the Basilica – which was by then going to rack and ruin – predates the decision as to where this new clock was to be placed.

It was 1493 when the Senate commissioned Carlo Zuan Rainieri of Reggio Emilia to create a new clock, but the decision that this was to be erected over the entrance to the Merceria only came two years later.

According to Marin Sanudo, the following year *“on 10 June work began on the demolition of the houses at the entrance to the Merceria (...) to lay down the foundations for the most excellent clock”*.

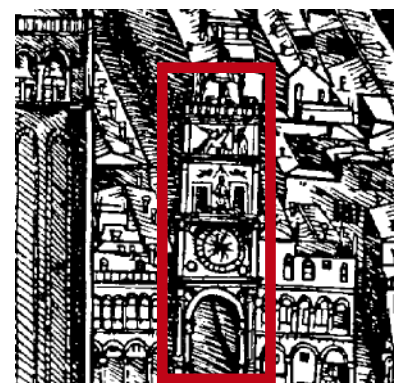
The diarist would later record, on the 1st February 1499, that the structure having been completed and the mechanism mounted *“the clock on the Square was unveiled for the first time; above the street that leads into the Merceria, it is most beautiful and ingenious”*. From the archway at ground level, the vertical structure rises on a rectangular base of around 9x6 metre through a quadruple series of scaled architectural orders to a terrace with the statues of the Moors.

At the time of its construction, it marked a clear break with the architectural language and layout of St. Mark's Square, which was still substantially as it had been created in the time of Sebastiano Ziani (12th cent.).

Following rulings handed down in 1500, and reiterated in 1503, the two side wings to the tower – culminating in two balustraded terraces – were built over the next five years. It should, however, be noted that it was not until after the fire of 1512 that plans got underway to rebuild the *Vecchie Procuratie* alongside (demolition of the existing structure started in February 1513).



Procuratie Vecchie and Bocha de Marzaria



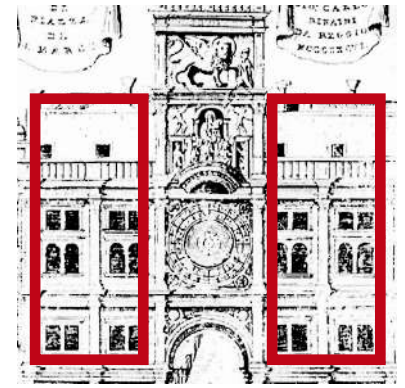
Jacopo de' Barbari, View of Venice, 1500, xylography  
Museo Correr, Venezia

But the Tower was also to play a key role in the overall urban layout of the city, being an essential point of focus along the two main sight-lines of façades (along the *Merceria* or from St. Mark's Square itself).

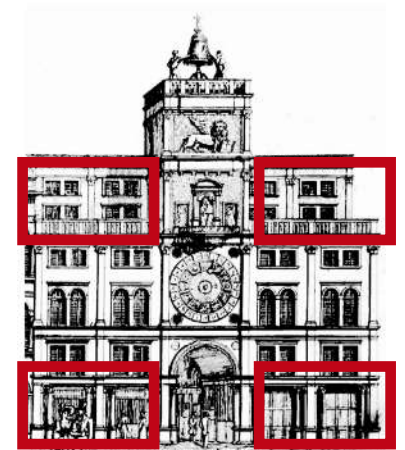
From St. Mark's it stands as a triumphal archway and monument marking access to the city's main commercial artery; from the *Merceria*, it serves as a sort of telescope, offering a perceptive view that takes in the seats of political power and the city's waterfront. More or less convincing evidence has been brought forward to attribute the structure to Mauro Codussi.

The design of the architectural orders is similar to that which can be seen in some of his other buildings; the same can also be said of the architectural nuances in design, and the sure way in which the ornamentation of the tower is subordinate to the structure as a whole (this decoration is particularly rich and perhaps eclectic, with various artists being involved in the production of the clock faces and the celebratory motifs included within the tower). In the mid 18th century Giorgio Massari raised the side wings above the terraces and added new balustrades; at the same time eight columns were added, reducing the light through the trabeation at ground level (this addition was almost certainly not the work of Tommaso Temanza, as is often claimed, but of a lesser-known architect, Andrea Camerata). However, neither of these changes could really disturb the power of the original design; though the whole was made rather heavier.

The work on the interior of the structure that was carried out in the nineteenth century (at the same time as that on the mechanism of the clock itself) was much more drastic: the wooden stairs were torn out and replaced with spiral staircases in metal, and the roofing of larch and lead sheeting was replaced with brick vaults and marble slabs (even the statues of the Moors were raised about a metre above their original level).



Clock Tower  
with the XVI century wings



Clock Tower with the  
XVIII century raisings and  
terraces

## THE CLOCK FACES

### South clock face to the St. Mark's Square

This clock face comprises: a fixed marble circle inscribed with the hours in Roman numerals; a mobile larger ring, bearing the signs of the Zodiac and the related constellations, the names of the months and the number of the days; a thinner ring bearing the hour hand in the form of a sun with a long ray; and an inner disk with the Earth (at the centre) and the Moon, which rotates on its axis to represent its various phases. The clock face as it appears nowadays is the result of a simplification of the late 15th century original, which also had the planets laid out according to the Ptolemaic system, each with its own ring so that it could rotate independently.

The moving rings are in wood faced with stout sheets of copper enamelled in blue, with the numbers and the stars in gilded embossed copper; the signs of the Zodiac are particularly well-crafted and date from the original clock face.



South Clock Face,  
to the St. Mark's Square

With the passage of days and months, the different speeds of the rings mean that the symbols of the sun and moon enter into the various constellations of the Zodiac.

## North clock face to the Mercerie

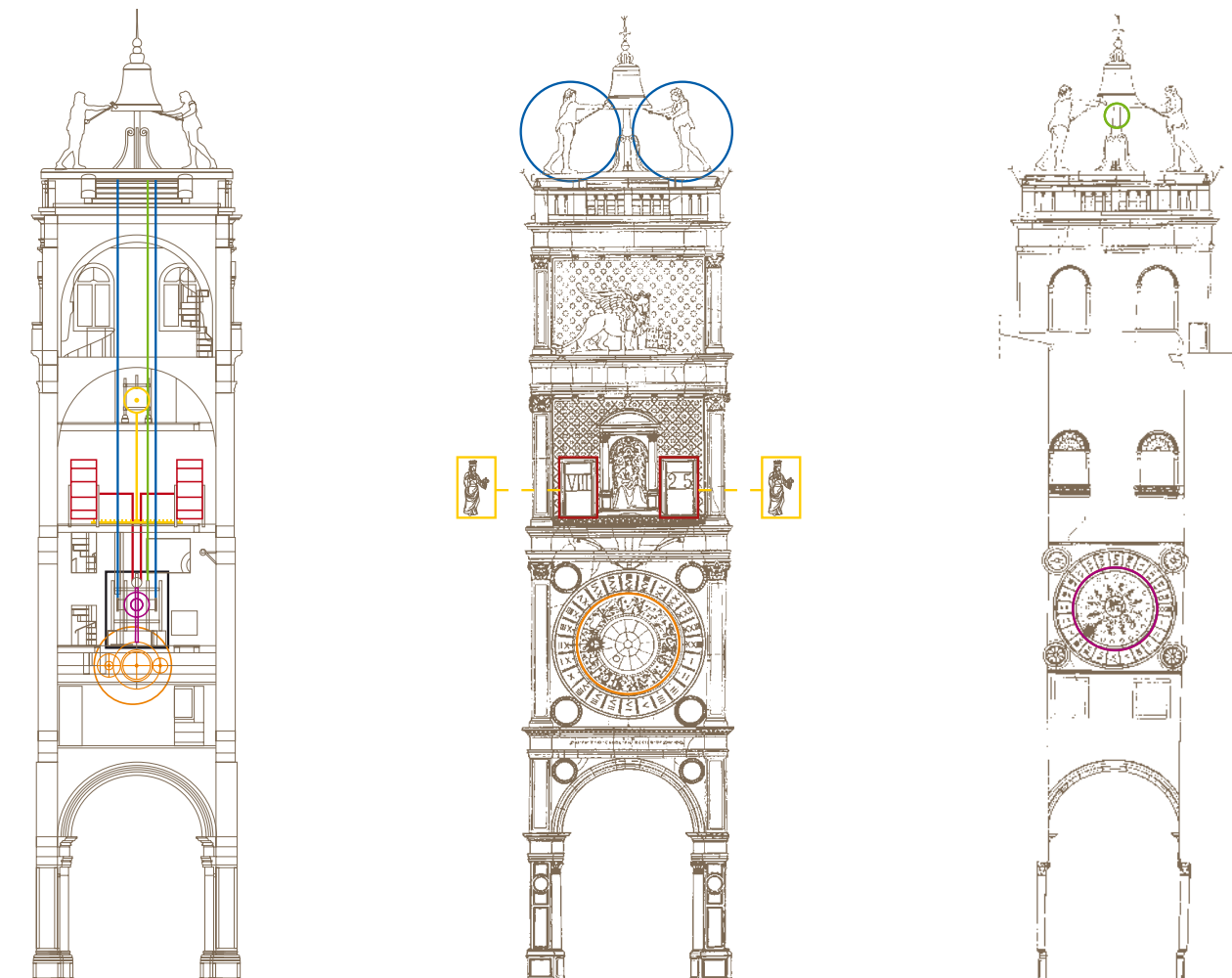
This clock face comprises: an outer fixed ring in marble, inscribed with the hours in Roman numerals, within which is a tondo of mosaic scattered with golden stars. Inside this is a moving disk (about 170 cm in diameter) of flaming rays in embossed copper, with traces of original gilding; face of the sun serves to indicate the hours.

At the centre is a copper St. Mark Lion; once gilded, this serves to cover the end of the axle transmitting power to the clock-hand.



North Clock Face,  
to the Mercerie

## The Overall Layout of the Tower



- The Workings of the Clock proper
- The Mechanism for the Magi
- The Hours and Minutes Barrels
- The 132-stroke Mechanism
- Workings of the astronomical Clock
- The Mechanism for the Two Moors
- The Clock Train



## THE ITINERARY

A first small flight of stone steps leads up to a little room in which the history of the Tower is explained. From here one can see the interesting network of pulleys, weights and counterweights as they silently rise and fall at regular intervals. A metal spiral staircase then takes one towards the complex workings of the clock proper; visitors get a close view of the mechanism and of the gears linking it with the south and north clock faces, overlooking St. Mark's Square and the Mercerie respectively. A further staircase then leads up to the next floor, where one can see the wooden statues of the Magi and the Angel as well as the two ornate doors from which these statues emerge in procession twice a year (on the feasts of the Epiphany and the Ascension). Here visitors can also see inside the mechanism of the clock barrels which indicate the hours and the minutes. Going even higher in the Tower one comes to a room which holds components from the 15th century clock mechanism. From here one can go out onto the two side terraces and, via a steep spiral staircase, up to the Two Moors Terrace, where one not only gets a close glimpse of the two colossal statues but also a splendid view of Venice and its lagoon.

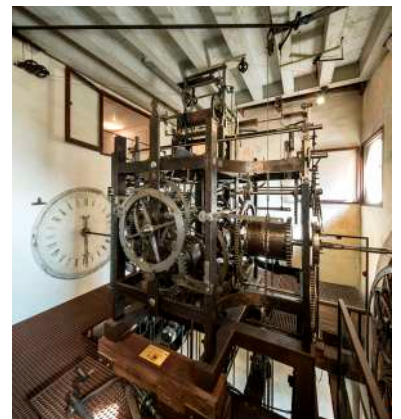
### The clock machinery

The heart of the Clock is a complicated system of gear wheels located within a large cruciform metal framework at the center of the Tower. The true 'engine' of the entire timepiece, this can be broadly divided into 4 distinct sections; along with these there is the machinery for the astronomical clock face and the workings of the clock barrels. Also known as 'clock trains', these 4 sections are similar in appearance and basically comprise: a barrel around which is wound a chain (formerly a rope) to which is attached the motor weight (100 kgs); an intermediate wheel; a rotating fan that serves as an aerodynamic brake to regulate the weight's speed of descent and thus the interval between clock strokes.

The fans are equipped with a ratchet that makes a very recognisable sound; this is activated at the end of each series of strokes and serves to disperse the accumulated kinetic energy when the rotating mechanism comes to an abrupt halt.

The clock train transmits the impulses which enable the pendulum to continue its isochronic oscillations. It also comes into play at fixed intervals to trigger the other trains of wheels and pins.

By means of thin vertical rods, it activates the barrel machinery every 5 minutes; as a result the minute barrel rotates through 30° (1/12 of a turn). Every 60 minutes, the hour barrel does the same. Upon each hour, the train mechanism for the Two Moors is activated. Two minutes before the hour, the Moor on the right strikes the bell; two minute after the hour, it is the turn of the Moor on the left.



Mechanism of the Clock

This is why the mechanism is described as a 're-striking' one. With the hammers they hold, each Moor strikes the bell on the top of the tower a total of from one to twelve blows, depending upon the hour. Finally, every 12 hours, the 132-stroke train is set in motion. These 132 'meridian' strokes occur at midday and midnight before the Moors strike the bell. They are rung by 2 supplementary hammers placed around the circumference of the bell; the number of strokes corresponds to that of the strokes hit by the two Moors in the previous 11 hours. The barrel mechanism also operates the astronomical machinery via the Moors wheel, which goes through a complete rotation every two hours, and a 22-tooth pinion. This latter goes through 12 rotations a day, turning all 264 teeth ( $22 \times 12$ ) on the large wheel, which turns the sun clock-hand through one entire circuit per day.

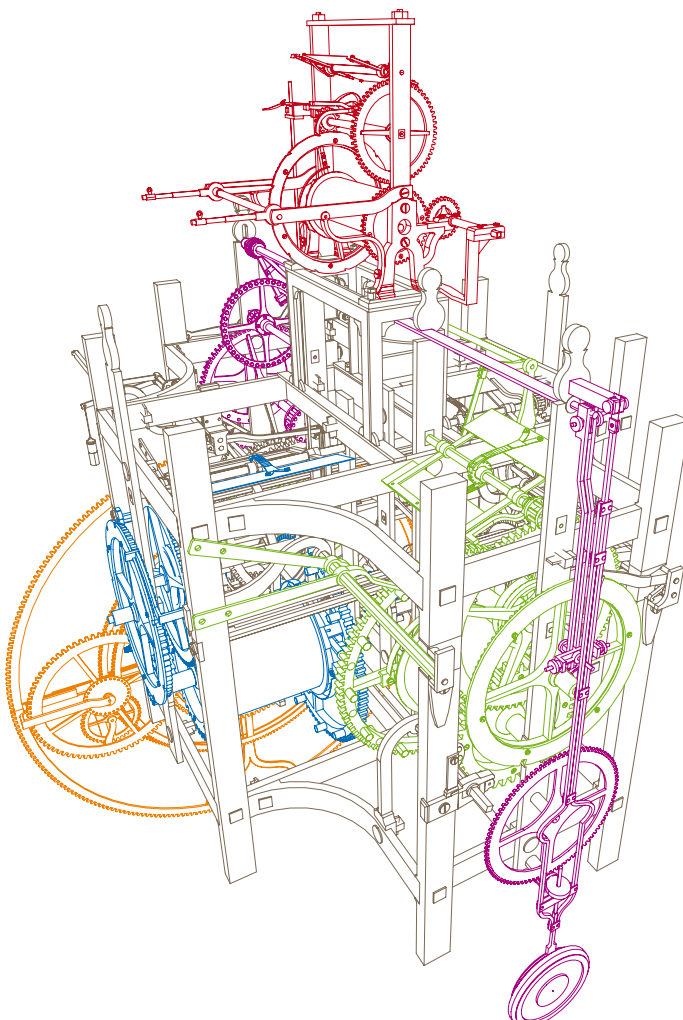
Finally, via a return mechanism and a long axle under the clock machinery, the Barrel Mechanism also operates the hour hand on the clock face giving onto the Mercerie.

The whole thing is driven by means of 5 train mechanisms, periodically recharged by the raising of the weights.

The pendulum and the anchor escapement regulate the perfect release of energy, so that the mechanism works in a constant, even manner. Still perfectly functional, the entire structure dates back to 1753-57, when Bartolomeo Ferracina significantly modified the original machinery built at the end of the 15th century by G. Carlo Ranieri.



Mechanism of the Clock



- The barrels
- Astronomical clock
- Train mechanism for the Two Moors
- Clock train
- 132-stroke train



## The barrels

The two rotating frames with the panels showing the hours and minutes were created and installed in 1858 by Luigi De Lucia; designed to make it easier for those down in St. Mark's Square to get a more precise idea of the time, they are among the first examples of this kind of mechanism in a public clock. The two barrels each bear twelve panels of 80 by 50 cms; one with the hours in Roman numerals, the other with intervals of five minutes in Arabic numerals. Once lighted from inside the barrels, the panels are made of sheets of blue-tinted zinc. The installation of this mechanism blocked the movement of the Three Kings, so twice a year a special mechanism to raise and lift it backwards comes into play, freeing access to the doors and the notched circle along which the Three Kings and the Angel move in procession before the statue of the Madonna.



The barrels

## The three Kings and the Angel

When the Clock Tower was built in 1499, the Three Kings and the Angel with the Trumpet were designed to come out every hour from the loggia on the second storey of the structure and pass in procession before the statue of the Madonna and Child. However, the delicacy of the complex mechanism meant it was subject to great wear and tear over time, so eventually the procession had to be reduced in frequency or stopped altogether. After Ferracina had re-designed the clock mechanism, he also worked on that governing the procession (1758-159); still in use today, it comes into operation only twice a year: on the Epiphany and the Feast of the Ascension. The actual wooden statues of the Three Kings and the Angel were re-done by Giovanni Battista Alviero in 1755; as stratigraphical tests – and various inscriptions in the machine housing – show, these rather crude works have been restored and completely repainted on several times.



The three Kings and the Angel

## The doors

Originally, the doors from which the Three Kings and the Angel emerged in procession were wooden structures covered with painted and gilded metal and decorated with two gilded angels in embossed metal.

In 1858, these doors have been absent for most of the year, replaced by two metal openings which are decorated with gilded geometric motifs and make it possible to reading the panels of the hours and minutes on the rotating barrels installed by Luigi De Lucia.



Wood door with the Angel and the Three Kings on the background

## The Moors and the bell

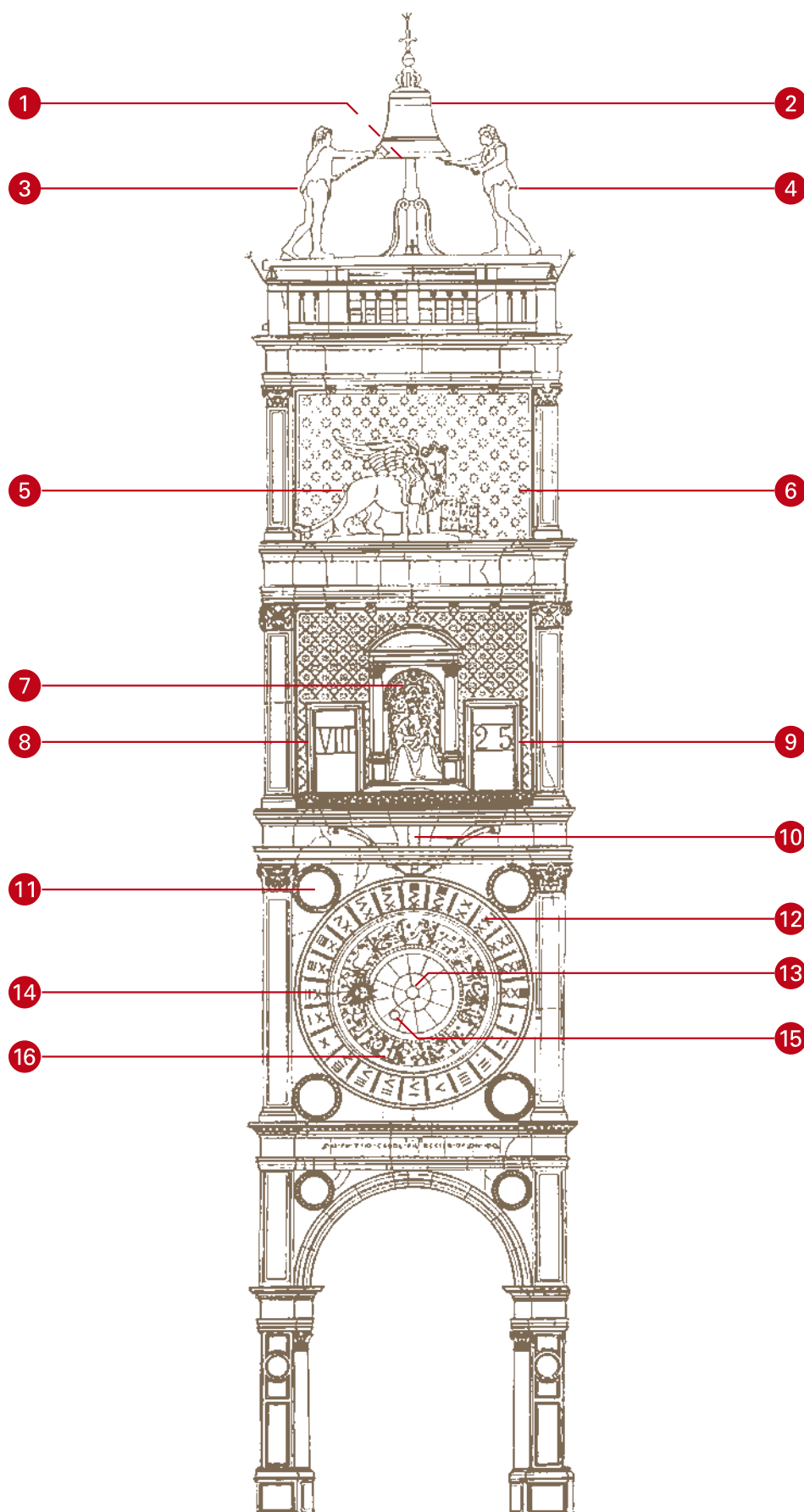
The two giant statues in bronze (traditionally known as “The Moors” because of the patina on the metal) were cast in 1497 by Ambrogio della Ancore; the body is hinged at the waist to permit the movement made in striking the bell. In spite of their function, the modelling of the statues deliberately exaggerates their mass, so that their form is unmistakable, even from a great distance. The bell, surmounted by a gilded sphere and a cross, was also cast in 1497. It was the work of a certain Simeone, who has signed his name with a fine inscription in the bronze. During the mid 19th century replacement of the roofing to the Tower, the bell and the two Moors were raised about a metre above their original level.



The Moors and the bell



## THE CLOCK TOWER TODAY



1. 132-stroke hammer
2. Bell
3. Lefthand Moo
4. Righthand Moor
5. Lion of St. Mark
6. Space once occupied by a statue of doge Agostino Barbarigo
7. Aedicule with figure of the Madonna
8. F Hours window (exit for the figures of the Magi and Angel)
9. Minutes window (return entrance for the figures of the Magi and Angel)
10. Bracket for the procession of the Magi
11. Oculi originally occupied by astrolabes
12. Hours dial
13. Terrestrial globe
14. Rotating dial with the hours and indicator in the form of the sun
15. Rotating dial with the moon
16. Rotating dial with the signs of the zodiac

# General information

## Venue

### Torre dell'Orologio

Piazza San Marco, Venice

## How to get there

### Vaporetto

Line 1, Vallaresso or San Zaccaria stop;

Line 2 Giardinetti stop;

Line 5.1 or Line 4.1, San Zaccaria stop

## Clock Tower - Opening Hours and Tickets

Visits **only upon prior booking, with specialized guide.**

The tour lasts about an hour.

Holders of the ticket for the Clock Tower get free admission to the Museo Correr, the Museo Archeologico Nazionale and the Monumental Rooms of the Biblioteca Marciana.

**For ticket information and opening hours please consult the website:**

**[www.palazzoducale.visitmuve.it](http://www.palazzoducale.visitmuve.it)**

## Bookings

- on-line: **[www.torreorologio.visitmuve.it](http://www.torreorologio.visitmuve.it)**

- calling the call center: **848082000** (from Italy); **+39 041 42730892** (only from abroad)  
*from Monday to Friday, excluding holidays, from 09:00 to 13:00*

The booking office will also reply to customers through the e-mail address  
[prenotazionivenezia@coopculture.it](mailto:prenotazionivenezia@coopculture.it)

## Accessibility



*The interior of the Clock Tower has various small spaces linked by narrow and steep stairs; therefore the building is inaccessible for those with walking difficulties and the visit is not recommended for pregnant women or for those who suffer from claustrophobia, vertigo, heart conditions or respiratory diseases. Children under 6 are not allowed.*

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