THE NEW WATER ORGAN OF THE VILLA D'ESTE, TIVOLI

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The first automatic water organ of the villa, which also happened to be the first in Italy, was built in 1566-69. Replaced by a new one a few decades later, during the eighteenth century it fell into disuse and was eventually destroyed. In 1999 the director of the villa – the architect Isabella Barisi – planned the construction of a totally new instrument inspired by the conventions for such instruments in the Roman Renaissance, and now in the same place of the old one: the Fontana dell’organo. The new organ, together with the related automatism, was built by Rodney Briscoe (in Diss, Norfolk, England), with the assistance of Leonardo Lombardi (a Roman specialist in hydraulic archaeology, who also directed the works) and Patrizio Barbieri. It was inaugurated on 18 June 2003, with the presence of the Minister of Cultural Affairs, Sandro Urbani.

Below is a short description of both the ancient and the new instrument.

The original water organ

The history of this instrument can be found in P. Barbieri, ‘Organì e automi musicali idraulici di Villa d’Este a Tivoli’, L’organo XXIV (1986), pp. 3-61. Nine years later, Marco Tiella, in L’Officina di Orfeo. Tecnologia e pratica degli strumenti musicali (Venezia: Il Cardo, 1995, p. 29) published a 1576 manuscript drawing which represented a water organ, though without remarking on it further. In one of the manuscript annotations we read (see Fig. 1, p. 34):
Fig. 1:
[Top:] Dominus Benedictus Manfotus Secretarius Domini Cardinalis d’Estis hoc diagramma organorum musicalium quae in pulcherrimo orto Tybiris ad motum fluvii camunt mihi dono dedit 1576.
[Bottom, left:] Claude fontainer francais du ma... Es... s auteur des orgues hydrauliques de Tivoli a fait [ce] mesme pourtraict.

Furthermore, in the light of a description left by a French tourist who visited the villa in that year (Nicolas Audebert, 1576) we now know that the drawing was done by Claude Venard, the builder of the organ. Indeed, the drawing is in full agreement with Audebert’s description:

The whole mechanism was housed in an underground airproof chamber, whose entrance was the trapdoor marked on the left.

A water-air emulsion was falling on a water-wheel through a vertical lead pipe and a funnel: thus (1) the chamber was filled with air at the pressure required by the organ-pipes, and (2) the water, turning the wheel, was operating the barrel bearing the pins (arranged according to the musical composition to be performed).

Each of the above-mentioned row of pins corresponded to a particular note and related lever: this one was opening a hole through which the pressure-air
of the chamber could enter into a thin lead conduit leading to the correspondent organ-pipe (see also Fig. 2, hypothetical).

![Diagram]

**Fig. 2**

It can be observed that such a mechanism was condemned to be rapidly devoured by the rust. In any case, at the beginning of the seventeenth century the new Baroque aesthetics imposed a change to the structure of the *Fontana dell'organo*, and a small chapel-like *aedicula* was built in the central niche (See Fig. 3, p. 36. Fig. 4, p. 37, was taken from an engraving by G.F. Venturini, 1691). Inside the *aedicula* a new instrument was installed. It was rather different from the first one, because this time not only the pipes, but also the whole mechanism was placed outside the air-chamber. The organ was provided with a keyboard of the usual kind, so that it could also be played manually. The barrel presented three different pieces, interchangeable at will. Its disposition was similar to the instrument represented in Fig. 5 (see p. 37), which is taken from Francesco Lana Terzi, *Magisterium naturae et artis ..*, vol. II (Brescia: Ricciardi, 1686).
The new instrument

Of the original organ’s components, only the stone air-chamber happened to survive, being incorporated in the structure of the fountain. The water falls into the chamber from a reservoir placed in the attic of the building; the air is sucked through a whirlpool that is formed at the level of the reservoir (see Fig. 6), and not through the lateral small sucking-pipes that may be seen in Fig. 5.

![Image of the air-chamber](image-url)

Fig. 6

The details of the new organ are as follows:

Blockwerk with four rows of pipes (4'.2'.1 1/3'.1'). A Principale 4' was chosen (instead of an 8') in order to overcome better the background noise of the falling water of the air-chamber and the nearby jets of the fountain.

Alloy of the pipes: 80% tin, 20% lead.

The repeats (ranks breaking back) were kept under 1/8' and the scaling large (flute-like), in order to strengthen the treble, which – with the correct Renaissance Italian repeats – had been found weak.

Note-range: from C to a”, plus a BB♭ and AA, added in the bass; in the treble, only the notes required by the tunes of the barrel are present.
Pitch: $a' = 440$ Hz. Equal temperament (in order to make easier the maintenance, the organ being without a keyboard).

The block wind-chest and the rack-board are made of phosphor-bronze. In this respect, it should be recalled that metal chests were already employed in some of the Roman water organs as early as the seventeenth and eighteenth centuries (see P. Barbieri, ‘Organi idraulici e statue ‘che suonano’ delle ville Aldobrandini (Frascati) e Pamphilj (Roma). Monte Parnaso, Ciclope, Centauro e Fauno’, L’organo XXXIV (2001). pp. 5-175).

Air-pressure at about 70 mm water-column, kept constant by two pressure regulators (see Fig. 7, in which can also be seen part of the barrel). The air is filtered through a mechanical dehumidifier, despite coming from the air-chamber already sufficiently (and surprisingly) dry.

Maximun air-flow supplied by the air-chamber: 57 litres per second.

The pallets are directly operated by the pins of a metal barrel 130 cm long, whose diameter is 24 cm (see Fig. 8). The barrel plays – in sequence – four tunes, for a total of about 4 minutes of music (their pins are disposed side-by-side on four different circumferences). A spare barrel, with different compositions, has
also been supplied. The original tunes being unknown, and in any case changing from time to time, the pieces at present are the following:

First barrel
Anonimo (1557), *Suite di falsi bordoni*
Francesco Mannelli (1st half seventeenth century), *Ciaccona*
Bernardo Pasquini (2nd half seventeenth century), *Partite sopra la aria della Folia da Espagna*
Agostino Soderini (1598-1608), *Canzone detta la ‘Ducalina’ (variazioni)*

Second barrel
Tielman Susato (1551), *Saltarello*
Antonio Valente (1575), *La Romanesca (variazioni)*
Anonym (sixteenth century), *La Shy Myze*
Anonym (sixteenth century), *La Doune Cella*

The aedicula is kept at constant ambient temperature and humidity. Its acoustical suitability had been previously checked and found perfectly satisfactory (reverberation time at 60 dB: less than one second; no remarkable eigen-frequencies; no selective filtering effect from the indoor to the outdoor through the openings). The door of the aedicula opens automatically and the organ is activated every hour at the hour (this is the only employment of electricity in the whole automaton). A TV-camera allows the tourists to see the details of the organ during the performance.

For the occasion, the tiny water organ (cuckoo and bird-chirping) and related mechanical automata of the *Fontana della civetta* (Fountain of the Owl) have also been rebuilt, together with the Renaissance *scherzi d’acqua* (i.e. the concealed jets to spray the unaware visitor).