



# Barry Lawrence Ruderman Antique Maps Inc.

7407 La Jolla Boulevard  
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## Sphaera Armillaris Copernicana [Rare Broadside of the Leiden Sphere]

**Stock#:** 26065  
**Map Maker:** van der Aa  
**Date:** 1711  
**Place:** Leiden  
**Color:** Hand Colored  
**Condition:** VG  
**Size:** 20 x 16 inches  
**Price:** \$ 2,400.00



### Description:

Fine broadside illustrating the so-called "Leiden Sphere," engraved by Pieter Vander Aa, in Leiden.

The Leiden Sphere, a mechanical armillary sphere or orrery, was built around 1670 by the clockmaker Steven Tracy, for the mayor of Rotterdam. It is among the earliest and most elaborate mechanical planetaria to be operated by a clockwork mechanism. The device depicts the Copernican solar system, in which the Earth and the other planets revolve around a stationary sun. In order of distance from the sun, the Sphere includes Mercury, Venus, the Earth (with its moon), Mars, Jupiter with the four Galilean satellites, and Saturn. The mechanism in the base of the Sphere regulates an accurate representation of the orbital periods of each of the planets and their inclined orbits around the sun.

In 1710, this magnificent piece was given to the University of Leiden, where it could be seen in operation for more than a century. Tracy incorporated 2 vertical brass rings (1.5 meters in diameter), which support



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a wide zodiac-band (28.6 cm) composed of embossed constellation figures cut from sheet brass and mounted in rectangular frames. The Sphere sits on a wooden cube (84 cm tall). A 13 cm clock-face at the top of the pedestal displays the time and slot apertures indicated the day, month and year.

Among the notable features of the Sphere, it was the first such device to incorporate a geared model of Jupiter's system. The basic design is similar to that of the Romer - Horrebow ceiling planetarium, but with a number of important additions, including the incorporation of offset cams to give the model planets a Keplerian motion similar to those on the Rittenhouse orries. The Saturn cam is inclined, whereas the other planets (other than earth), the cams are horizontal.

Following receipt, the Sphere was thoroughly overhauled by the Den Haag clockmaker, Bernard van der Cloesen. The Leiden Sphere still resides in Leiden, in the Rijksmuseum.

The illustration provides an excellent depiction of the sphere, although it omits the eccentric collars, but adds a ring for the celestial equator and a spindle that passes upwards through the sun. There are apparently two editions of the broadside, one in French and Dutch (the present example) and one in English and Dutch. Both are exceedingly rare. The original English translation of the text is as follows:

THE AUTOMATICK  
OR SELF-MOVING SPHERE,  
Mended and repair'd by THRASIVS,  
Which was done by the Invention and direction of  
Mr. ADRIAN VROESIVS, according to the Calculation of  
NICOLAS STAMPIOEN.  
Which was given to the Publick use by the Widow and Heirs of  
Mr. SEBASTIAN SCHEPERS,  
Late SENATOR of the City of Rotterdam, &c. &c. &c.  
Now improv'd and put in better order by BERNARD CLOESEN.  
Which the CURATORS of the University of LEYDEN,  
and BURGERMASTERS of the City have presented  
for the benefit and encouragement of Learning & Astronomy,  
in the Year MDCCXI.

Description of the Armillary Copernican Sphere.

THE whole Sphere is made of brass and likewise the greater Circles, (viz.) the Æquator, the two Colures, and the Ecliptick, which divides the Zodiack in two equal parts with respect to its latitude, hence the Zodiack has ten degrees of latitude on each side, the twelve signs upon the Zodiack are done with chas'd



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work and their names mark'd upon the Ecliptick. The Ecliptick is divided into degrees and half degrees, the Diameter of each of these Circles and consequently of the whole Sphere is five Rhinland feet.

The Sphere stands upon a Pedestal of three feet high, in which is enclosed a Clock with its Pendulum and weights which goes nine days without winding up, and may be made to go longer at pleasure, it not only shews the years, the months, the days, the hours and minutes, but likewise the motions of all the Planets both primary and secondary, in which the Earth is reckoned, according to the Copernican System, if you except the Satellites of Saturn, they all move in the order following.

The Sun is placed immovable in the center of the Sphere, and altho' it is here fixed, yet it is easy to imagine that it turns round its axis.

Mercury is next to the Sun and describes the shortest of all, consequently performs his course in 88 days.

Venus is next to Mercury and being further distant from the Sun, by consequence describes a greater Circle, which it compleats in 225 days.

In the third place is the Earth being carried round the Sun together with the Moon in its annual motion in the space of 365 days and almost 6 hours, and moves round its Center every 24 hours which is its diurnal motion, and has its axis always parallel to it self, so that its poles are always turned opposite to the same points of the Heavens; which Parallelism, according to the sentiments of some is owing to a certain motion which is called that of inclination.

The Horizon and Meridian of the Earth are moveable in this Sphere, so that the latitude of any place being given, the length of the night and the day may be known and even the hour of the day.

While the Earth with the Moon goes round the Sun in its orbit in a years time, the Moon moves round the Earth in 29 days and 12 hours in a Circle, which if produced, will cut the Ecliptick in two points diametrically opposite, which points are called Nodes by Astronomers; this is which is subservient in order to know, every day, its latitude both North and South, as likewise the time of Eclipses as well Solar as Lunar.

In the fourth place is Mars, which being further from the Sun than the Earth, makes its tour in 687 days.

In the fifth place is Jupiter, which with his four Satellites performs his course round the Sun in a 11 years, 315 days and 20 hours; while in the mean time each of the Satellites moves round Jupiter, (viz.) that which is next to Jupiter, moves round in 42 hours and  $\frac{1}{2}$ . The second b in 3 days and 13 hours and  $\frac{1}{2}$ ; The third c in 7 days & 12 hours; The fourth d, being the furthest from Jupiter, goes his round in 16 days and 18 hours.



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The last Planet and which is furthest from the Sun is Saturn, which is immoveable in this Sphere as well as its ring; The five Satellites of Saturn are here also immoveable and fix'd to the Ring, there being no room to make them otherwise, nor was it indeed very necessary: Saturn moves in his orbit round the Sun in 29 years, 166 days, and 12 hours.

NB. If the Circles of the Planets be produc'd, they will cut the Ecliptick, so that the Latitude of any place whither North or South may be found.

Here may be also seen the directions of the Planets, when they are Stationary and when Retrograde, and their motions when retarded and when accelerated.

It is not needfull to inform you, that every time the Sun is view'd from the Earth in a streight line, one may know in what sign of the Zodiack the Sun is, and even in what degree of the sign.

If you move the Clock, the positions of all the Planets, may be seen both for the time past and for the time to come, and that even without stopping or incommoding the Clock-work any manner of way.

Moreover, the motions of the Planets during some months have been observ'd in this Sphere, and it has been found that they exactly agree with the most modern and most accurate observations of Astronomers.

**Detailed Condition:**

Some misfolds and repaired tears in the upper right corner and a bit of soiling.