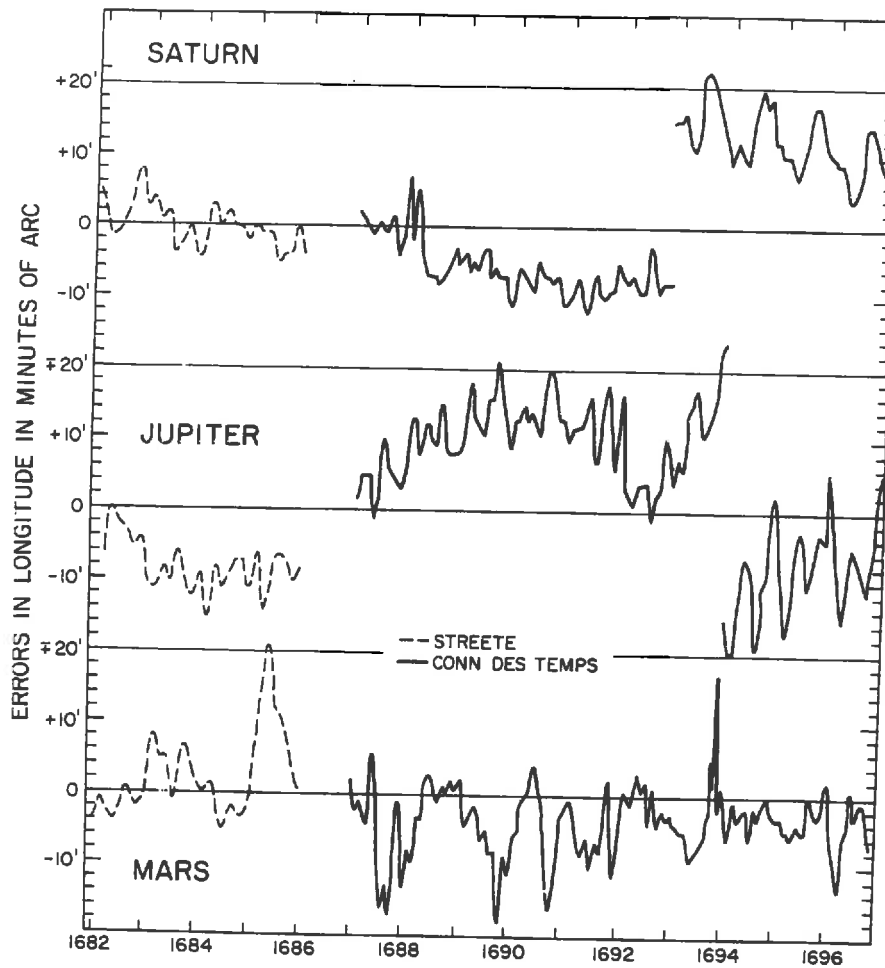
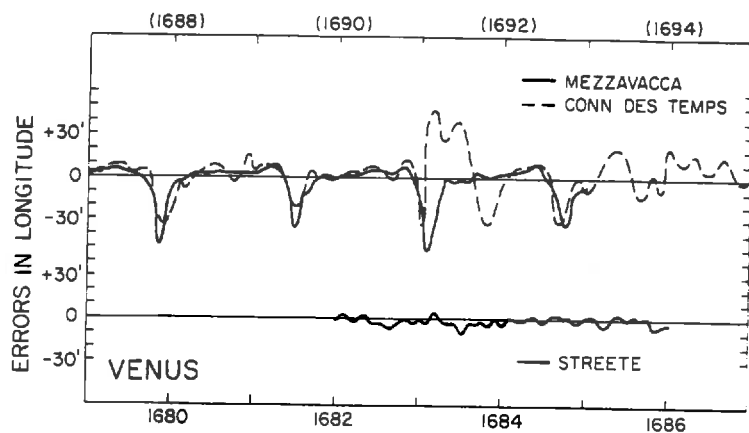


Graph 3



Graph 4



Graph 5

In Graph 3, which shows errors in ephemerides of Venus, it is noteworthy that Durret's positions match those of Eichstadt and Wing very closely; they have apparently been determined from almost the same elements and theory. The errors in the Venesian ephemerides of Argoli and Montebruni are three to four times larger, and so have been plotted separately.

In Graph 4 Streete's almanacs of 1682-85 are compared, for the superior planets, with the *Connaissance des temps*, begun in 1679 by the Paris Academy of Sciences. The errors in both are considerable, even for Mars which, unlike Jupiter and Saturn, is not subject to sizeable long-term perturbations.

Graph 5 compares the Venesian ephemerides of Streete, the *Connaissance des temps*, and Flaminio Mezzavacca (d. 1704), who appears to have copied at least some of his positions from the ephemerides of Argoli. Streete's superior accuracy is evident: it is due in part to the superior solar theory he inherited from Horrocks, and in part to his employing Kepler's third law to determine the mean solar distance of Venus - a practice that derives from Horrocks.

	ORBITAL TRAJECTORY	LOCATION VS. TIME	MEAN DIST. FROM SUN
KEPLER	ellipse	area rule	from observations
BOULLIAU	ellipse	a geometric construction	from observations
HORROCKS	ellipse	area rule	via 3/2 power rule
STREETE	ellipse	Boulliau's construction	via 3/2 power rule
WING	ellipse	oscillating equant ----- a geometric construction	from observations
MERCATOR	ellipse	a geometric construction	from observations

**Table 1. Seven Comparably Accurate Ways of Calculating
Planetary Orbits as of 1680 – All Known to Newton**

Open Questions in Astronomy, 1679

1. Which of the several more or less comparably accurate yet still discrepant orbital calculation procedures is to be preferred?
2. Does Kepler's or any other of these procedures amount to anything more than just a transient approximation to the true motions, as Descartes would have them?
3. What is the nature and source of the comparatively large discrepancies exhibited by Jupiter and Saturn?
4. What are the proper corrections to observations for parallax and atmospheric refraction?
5. Is the speed of light really finite and, if so, what corrections to observations are needed to adjust for it?
6. What is the motion of the Moon and why is it so much more complicated than e.g. those of Jupiter's satellites?
7. What are comets and what trajectories do they describe as they pass through the planetary system?
8. Does the strength of surface gravity really vary from one place to another and, if so, according to what rule?
9. Are the planets being carried around by vortices and, if not, then what retains them in orbits that are at least roughly elliptical?
10. What, if anything, should be made of the seeming fact that the centrifugal *conatus* of the planets varies in an inverse-square ratio with mean distance from the Sun?