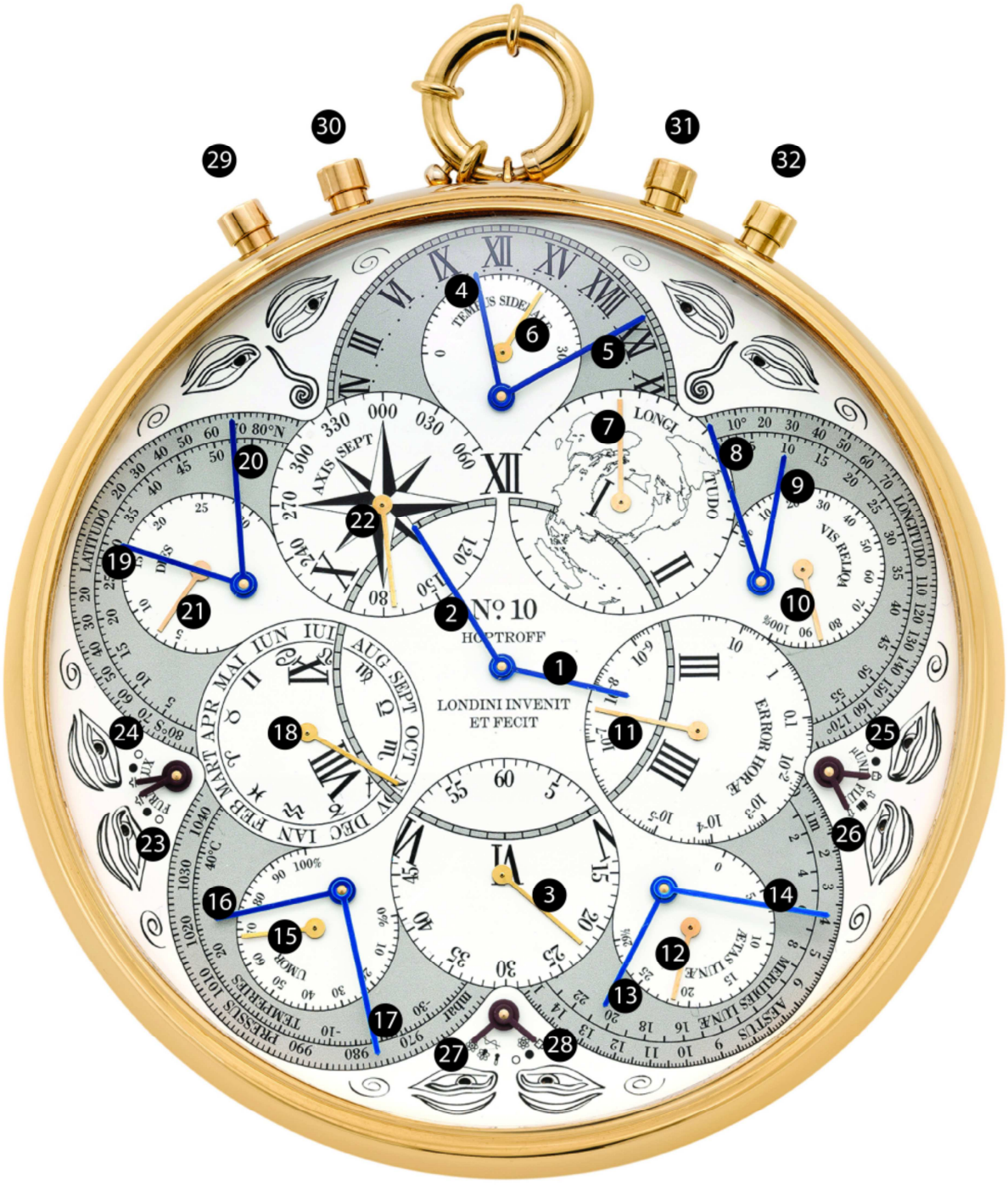
A Guide to the No.10 – Front side



TEMPUS (Time)

The current 12-hour time (local and UTC selectable), as measured by the atomic clock.

1. Hour, 1 – 12
2. Minute, 0 – 59
3. Seconds (atomic), 0 – 59

TEMPUS SIDERALE (Sidereal Time)

Sidereal time measures the rotation of the earth relative to the stars, rather than the sun. Although it uses a "24-hour" clock dial, each sidereal "day" is actually 23 hours, 56 minutes 4 seconds long. This is why the seconds hands (3) and (6) are not in sync. Stars rise and set at the sidereal time every day.

4. Sidereal hours, 0 – 23 (retrograde), as measured by atomic clock
5. Sidereal minutes, 0 – 59 (retrograde)
6. Sidereal seconds, 0 – 59 (pendulum)

LONGITUDO (Longitude)

Longitude measures the angular position east or west of Greenwich, UK. This value is set with a sextant using the noon sight method, in order to compare local noon with a chronometer reference time, just as Harrison did, except with an atomic clock and without the need to refer to admiralty tables.

7. Longitude – coarse degrees, 180°E – 180°W
8. Longitude – fine degrees, 0° – 180° (retrograde)
9. Longitude – minutes, 0' – 59' (retrograde)

VIS RELIQA (Power Remaining)

10. Battery power remaining, 100% – 0%

ERROR HORÆ (Time Error)

From moment the time is set, timekeeping slowly drifts. (In the case of atomic timekeeping, extremely slowly.) The Time Error is a measure of the maximum degree to which timekeeping could have drifted.

11. Time error, 10^{-9}s – 10s (logarithmic)

ÆTAS LUNÆ (Moon Age)

The traditional moon age indication, in days since the new moon.

12. Moon age in days, 0 – 29½ (retrograde)

MERIDIES LUNÆ (Lunar Transit)

The local time when the moon will be highest in the sky. Moonrise will be six hours before lunar transit, moonset will be six hours after.

13. Transit time, 00:00 – 23:50 (retrograde)

AESTUS (Tide)

The local tide height. Tidal harmonics vary throughout the globe, based on the relative positions of the sun and moon, and the local geography. First modelled by Sir William Thomson in 1860, these eight tidal harmonics are stored for three thousand ports worldwide. The closes port is selected for the indication. It is the most complex complication in the timepiece.

14. Tide height, -½m – 15m

UMOR (Humidity)

15. Relative humidity, 0% – 100%, as measured by on-board instrument, with 24-hour historic animation

TEMPERIES (Temperature)

16. Temperature, -40°C – 50°C, as measured by on-board instrument, with 24-hour historic animation. (Note: Usage below -35°C is not recommended due to battery chemistry.)

PRESSUS (Pressure)

17. Atmospheric pressure, 955mbar – 1045mbar, as measured by on-board instrument, with 24-hour historic animation

ANNUS (Annual wheel)

The annual wheel smoothly completes a rotation once per year.

18. Month, Jan – Dec. Common constellation of solar transit, ♈ – ♓ (Aries – Pisces)

LATITUDO (Latitude)

Latitude is the angular position north or south of the equator. After a noon sight is taken, the noon sun height is entered on this dial, and then the actual latitude is determined relative to the declination of the sun.

19. Latitude – minutes, 0’ – 59’ (retrograde)
20. Latitude – degrees, 90°S – 90°N

DIES (Date)

21. Day of the month in the local time zone, 1 – 31 (perpetual).

AXIS SEPT (Due North)

22. Due north, as measured by on-board instrument, with 24-hour historic animation. Selectable correction for magnetic deviation from true north

THE ATOMIC CLOCK

The most accurate ‘pendulum’ yet discovered is the wavelength of light emitted or absorbed during an electron’s transition between higher and lower energy states. The No.10’s physics package measures the atomic transitions of Caesium gas held in a tiny vial. An oven heats it to a constant 130°C to ensure that temperature changes do not affect the sensors. A laser pumps the electrons into transition, and a microwave resonator then locks onto the transition frequency. A digital signal processor then counts 4,596,315,885 such transitions to determine that a second has elapsed.

In watchmaking terminology, it ticks at a rate of 1.6×10^{13} (16 million million) vibrations per hour, and the resulting tick is accurate to one and a half seconds per thousand years.

Why is this accuracy necessary? For marine navigation. Even the most accurate temperature compensated quartz movements drift by several seconds per year. Every second inaccuracy equates to a nautical mile in navigational terms.

FURN (Oven)

23. Oven status: Off, On, Stable.

LUX (Laser)

24. Laser status: Off, On, Stable.

µUNDA (Microwave)

25. Microwave resonator status: Off, On, Stable.

FLUX (Power)

26. Atomic clock power: Charging, External Power, Discharging.

TIMEKEEPING MODE

27. Timekeeping mode: Pure Atomic (A), Atomic Disciplined Quartz (ADQ), Temperature Compensated Crystal Oscillator (TCXO).

ATOMIC RESONANCE DETECTOR

28. Atomic resonance detection: Off, On, Locked.

PUSHERS

29-32. Control pushers. Functionality to be finalized.

REVERSE DIAL

A further 20 or so complications are planned for the reverse dial, which will be developed in 2014.