The Victorian ‘Local Area Network’: the American Method of Transits

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An astronomical meridian circle was mounted so as to confine its observations to the meridian (the imaginary line running from due north to due south through an observer’s zenith). The telescope was supported on a horizontal axis that rested in Y’s fixed to the uprights. The graduated circles turned with the axis, indicating the altitude to which the telescope was elevated (A transit telescope lacked the graduated circles).
A Morse register was the standard apparatus at 19th-century telegraph offices for recording messages. Dashes or dots and spaces could be recorded quite rapidly on the moving fillet or paper tape. Cincinnati inventor John Locke adapted the Morse fillet for simultaneously recording clock pulses and meridian timings.

3. Mitchel’s chronograph

- In the revolving-disk chronograph designed by Cincinnati Observatory director Ormsby McKnight Mitchel, a make-circuit clock marked every other second with a tiny dot. At the end of every revolution, the disk’s position was shifted by 0.07 inch.

4. Record from Mitchel chronograph

Two hours of observations could be recorded on each circular sheet of the Mitchel chronograph, on which alternate seconds appeared as radial dotted lines and observations as dots irregularly in between.

5. Bond’s chronograph

In the cylindrical chronograph designed by Harvard College Observatory director William Cranch Bond, a cylinder covered with a large rectangular sheet of paper revolved once per minute; an ink-filled glass pen marked time as a continuous line that was offset momentarily by each tick of an astronomical clock.

The marked sheet, when taken off the cylinder of the Bond chronograph, had the minute columns nearly vertical (being slightly spiral on the cylinder) with the seconds marked off horizontally on each minute scale. As with Mitchel’s disk, each 13-inch-long rectangular sheet contained two hours of observations.

7. Winlock’s switchboard at HCO

Switchboard at the Harvard College Observatory, first installed in 1859, was basically an internal telegraph system used as what today would be called a local-area data network. The arrangement, here of the upgraded system installed in 1871, shows the switchboard from both the top (most of the picture) and the side (far right). Six pairs of wires (top) could be connected through four switches (middle plate) to link any combination of three instruments (bottom); the connections shown make a circuit between the west equatorial (a refracting telescope of 4½ inches aperture and 60 inches focal length) with the south clock and the east chronograph.

8. Telegraph increased productivity

► The telegraph literally influenced telescope—specifically eyepiece—design. Because an astronomer could tap a telegraph key as rapidly as a piano key, the observer could keep eye glued to eyepiece and make timings every second or two instead of needing 10 or 15 seconds between wires to write down observations. Thus, instead of being restricted to the five or seven vertical wires standard in transit telescope eyepieces of the 1840s (top), wires could be more closely spaced. As a result, 19th-century astronomers made eyepieces with 35 or more wires—including special-purpose ones with wires at a 45° angle (bottom) for measuring differences in declination (north polar distance) as well as right ascension (celestial longitude) for star catalogues.