

two inches in length nailed on top in the direction of the line for the purpose of marking the ends of the tape. An additional support is set for the centre of the tape when one more than 100 feet in length is used. This may consist of a stake driven in line with the end hubs and a nail driven in at the proper elevation for supporting the tape at the centre. When measuring, the tape is usually handled by four men. Thermometers are attached about one-fourth the length of the tape from each end and read by the men who attend to the marking. Two men carry levers which they connect with the rear end of the tape with a chord and at the front end to a spring balance which is attached to that end of the tape to measure the pull or stress. The tapes are usually adjusted so as to give the proper length at a temperature of 62° F. and a tension of 15 kilogrammes (about 33 lbs.). While the marker at the rear end of the tape regulates the distance until the mark at the end coincides exactly with the mark on the copper strip the marker at the fore end with a sharp brad marks that end as soon as the balance shows the proper tension and the signal "all right" is given by the other marker. Both thermometers are then read and noted and the tape carried forward to the next hub where the process is repeated until half a mile or sometimes a mile has been measured in one direction, then the same process is followed measuring back — the measurements being made in both directions.

In returning it sometimes becomes necessary to set back or forward an inch or so on the hubs that the marks at the end of the tape may always be on the zinc or copper strip. A scale of parts is carried for measuring these small distances which are entered in the notes as set back or forward as the case may be.

For the purpose of deducing the horizontal distance the difference in the elevation of each hub is taken with a spirit level then the corrections are for slope, for temperature and for distance set back or forward, also for the tape constant. Levels are also taken on cross section lines run out for half a mile on each side of the main line, as often as may be found necessary to secure data to place 20 foot contours accurately on the maps.