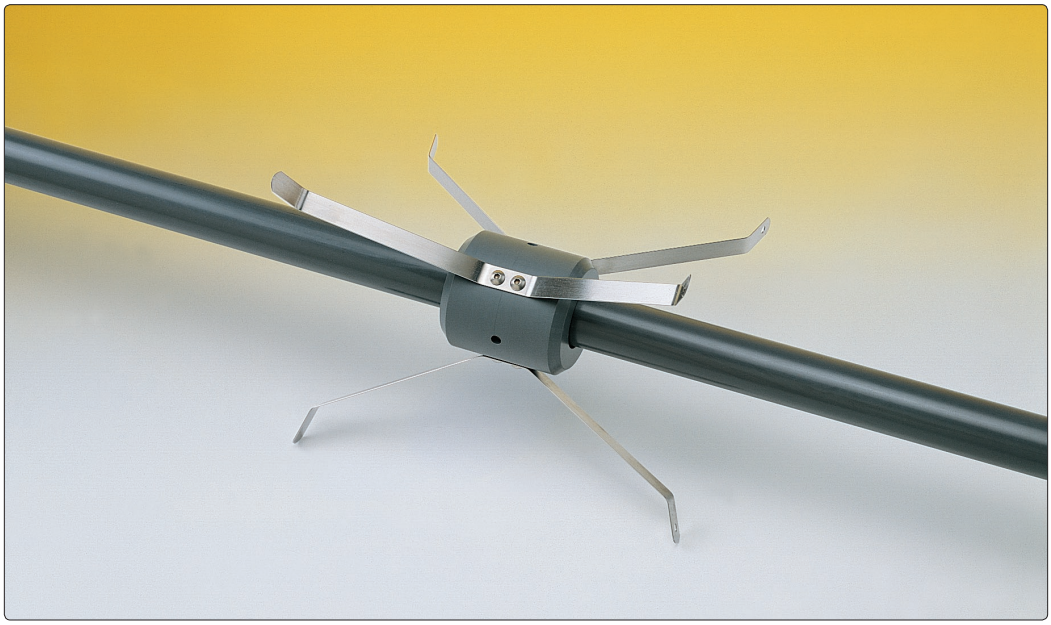
Magnetic Extensometer

Applications

The Model 1900 Magnetic Extensometer is designed for the measurement of settlement or heave of soft ground in or around…

- **Excavations**
- **Foundations**
- **Dams**
- **Embankments**
- **Sheet piles and slurry walls**
- **Tunnels**



Model 1900 Magnetic Extensometer.

Operating Principle

The Model 1900 Magnetic Extensometer is designed to measure settlement or heave of soft ground under the influence of loading or unloading due to the construction of embankments, fills, buildings, and structures.

A reed-switch probe is used in conjunction with magnetic anchors positioned at various depths in a borehole drilled in soft ground, or positioned inside fill material as it is placed on the original ground surface. A telescoping 1" sch. 80 PVC access tube passes through the various anchors and allows the reed-switch probe to be lowered inside the tube on the end of a nylon-coated steel graduated tape.

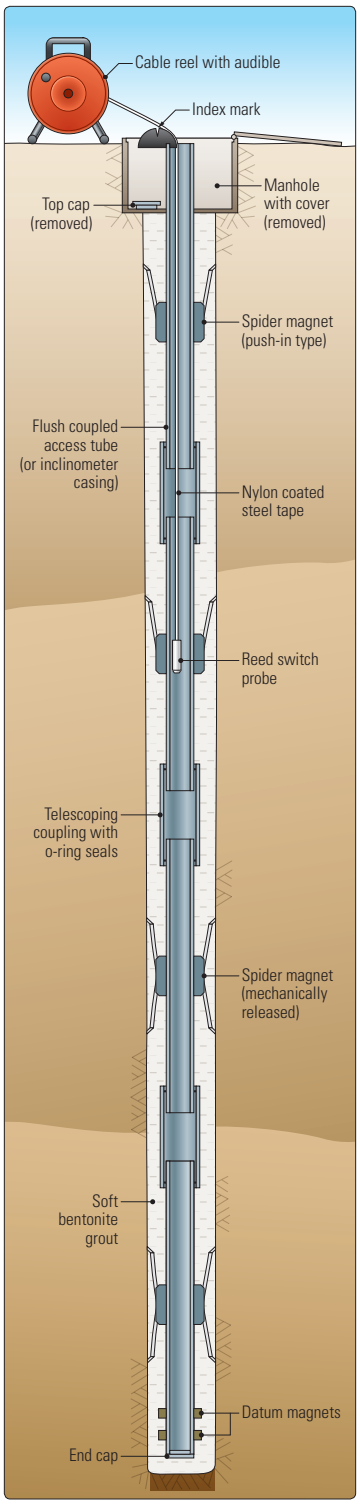
The steel tape contains two conductors which connect the reed switch inside the probe to a light and a buzzer located at the surface inside the tape reel. When the probe is positioned opposite an anchor, the magnet in the anchor causes the reed switch to close and the buzzer to sound. The tape (which is graduated in 0.01 ft. or 0.01 mm) is then read opposite an index mark located at the top of the access tube.

Advantages and Limitations

The design of the Model 1900 Magnetic Extensometer provides a means for determining the total displacement and the displacement for each inter-anchor zone.

In most cases the bottom of the access tube is deep enough to be located in solid ground. A datum magnet anchored to the bottom of the access tube provides a stable benchmark datum to which all the other anchor measurements are referred to in order to calculate the absolute settlement of each anchor point relative to the benchmark.

If the bottom of the access tube cannot be located in the solid ground then it will be necessary to reference the position of each anchor to the top of the access tube and to transfer this elevation to an external benchmark by normal level surveying techniques.



A typical Model 1900 borehole installation.

System Components

Anchors are of three types. Those used in fills are shaped like circular plates; in boreholes a "spider" anchor is used, which has six mechanically activated leaf spring arms. When installed, the arms are held in a closed position next to the access tube. When the anchor is at its correct location inside the borehole, a release mechanism is actuated, and the arms spring out and grip the sides of the borehole.

A third type of anchor is similar to the spider type described above, except that it has only three arms and is installed inside the borehole by pushing it down around the access tube, using setting rods, until it is at the correct depth. The spring-loaded arms exert a continuous outward force and scrape along the borehole walls as they are pushed into the hole.

Datum magnets are fixed to the bottom of the access tube and serve as a reference or datum that is assumed to be in a fixed position, i.e., below the zone of settlement. The positions of all the magnetic anchors above are referenced to the datum magnets to calculate the amount of settlement in the various inter-anchor zones. If the datum magnets cannot be located in stable ground then it will be necessary to periodically survey the top of the access tube.

Technical Specifications

Standard Range	unlimited (cable lengths 30, 150 m)
Resolution	±1 mm
Repeatability	±3 mm
Temperature Range	–30° to +80°C
Probe Material	Stainless Steel
Tube Size	PVC 1" sch. 80
Telescoping Section	300 mm
Borehole Size	102 to 152 mm

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