

## MODEL 1610



Model 1610 Tape Extensometer.

### APPLICATIONS

The Model 1610 Tape Extensometer is designed for the measurement of small changes of distance between two points located in or on:

- Tunnels and mine openings
- Buildings and structures

### OPERATING PRINCIPLE

The Model 1610 is based on a design by Peter Ealey. It measures the change in distance between pairs of eyebolts mounted on the walls of tunnels, in structures, or on unstable slopes, etc.

The Model 1610 uses a stainless steel measuring tape in which holes have been punched at precise intervals (every 50.00 mm or 2.000 inches). The tape is held inside a frame, which also houses a digital micrometer

and electronic tensioning device. In use, the hook on the end of the tape is clipped onto the first eyebolt and then the tape is allowed to unreel until the hook on the end of the tape extensometer frame can be clipped to the second eyebolt. The slack is taken out of the tape and a pin on the frame is then located in one of the holes in the tape. The tape-tensioning handle is now turned, shortening the

length of the frame, and increasing the tension on the tape. When the correct tension has been achieved, as indicated by a system of red and green lights, the digital micrometer is read.

This procedure is repeated from time to time so that any difference in the readings is a measure of a change in distance between the two eyebolts.

### ADVANTAGES AND LIMITATIONS

The Model 1610 Tape Extensometer uses a machine-punched stainless steel tape set in a frame housing an electronic digital micrometer. The length of the frames and the tapes are carefully controlled during manufacturing, making them fully interchangeable. Damaged or broken tapes can be replaced without significant loss in data continuity.

The tapes are very light, so that errors due to sag are minimal, and they are made from stainless steel for corrosion resistance.

The Model 1610 has a user-friendly winding handle for tensioning the tape that greatly reduces the time and effort required to take readings. The correct tape tension is indicated by means of an electronic tension indicator, which eliminates the need

to align index marks by eye. Accuracy to 0.1 mm is easily achievable.

Under most underground conditions, the digital readout is easier to read than a dial indicator. However, in bright sunlight the display may be difficult to read.

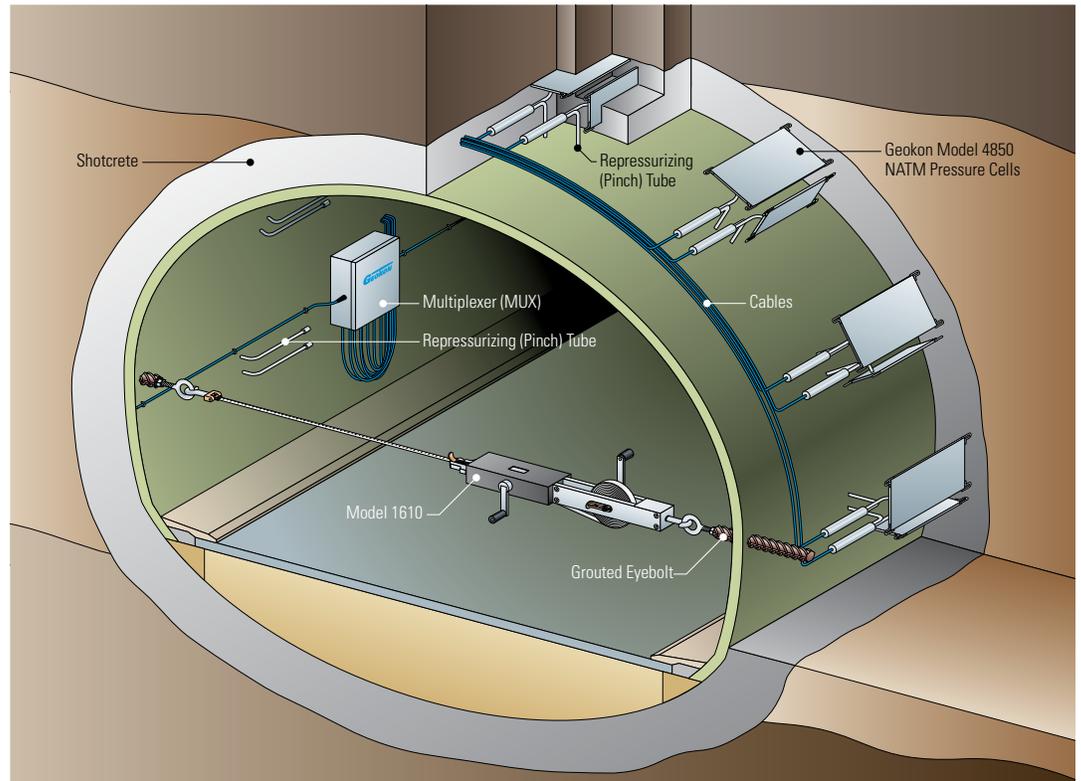
A yearly maintenance service is available and recommended to keep the extensometer in good condition.



Model 1610 shown with carrying case.



Model 1610-10 Hook Manipulator.



The Model 1610 as used to monitor the efficacy of concrete linings in tunnels supported by shotcrete (NATM).

#### SYSTEM COMPONENTS

The Model 1610 Tape Extensometer consists of a frame which houses an electronic digital micrometer, a tape tensioning handle and an electronic tape tensioning system with red and green indicator lights. A button located on the side of the frame enables the digital depth micrometer to be turned on and off and allows the zero reading to be reset.

The stainless steel tape is clipped into the frame and may be removed easily for replacement or cleaning. A sliding

tape clip prevents the locating pin from slipping off the tape while it is being tensioned.

The tape extensometer is supplied in a sturdy carrying case complete with operating manual.

Accessories include groutable style eyebolts for use in concrete tunnel linings, or for installation in boreholes drilled in rock. Expansion type anchors may also be used in boreholes. Weldable or boltable style eyebolt

anchors are available for attachment to steel supports or structures.

Accessories are also available to enable the tape extensometer to be used in large diameter tunnels without the need for ladders or scaffolding (see Model 1610-10 Hook Manipulator, left inset).

The use of a zero reading test frame is recommended to detect any change in the overall length of the tape extensometer assembly with time.

#### TECHNICAL SPECIFICATIONS

Tape Lengths	20, 30, 50 m and 66, 100, 165 ft
Tape Tension	10 kg
Accuracy	±0.1 mm
Indicator Battery	9 Volts (pp3)
Digital Micrometer Battery	3 Volts (CR 2032)
Weight	2 kg
Overall Length	520 mm
Operating Temperature Range	0°C to +50°C
Case Dimensions	500 × 350 × 125 mm