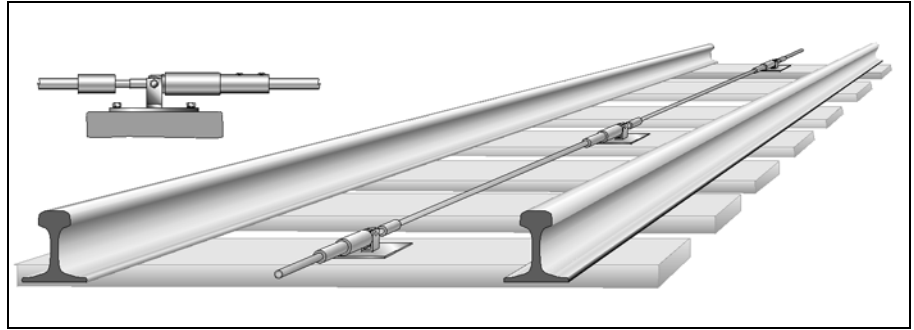
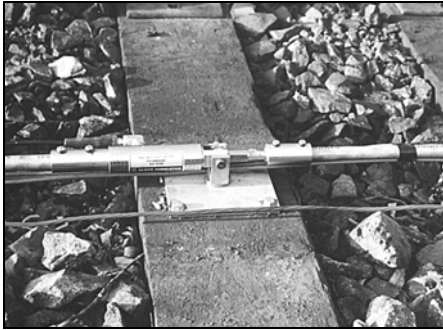


# Track Monitoring System



## Application

Track monitoring systems can help maintain the safety of railroad tracks by monitoring settlement and twist.

The systems are installed on tracks that may be affected by nearby tunneling or excavation. They are also installed on tracks that cross potential washout and landslide areas.

## System Components

**Track Settlement Sensors:** Track settlement is monitored by linked EL settlement sensors that are mounted directly on the ties (sleepers), parallel with the rails. With continuous, tensioned rails, sensors are anchored in the ballast rather than to the ties.

**Track Twist Sensors:** Track twist is monitored by twist sensors mounted on the long-axis of the ties.

**Data Acquisition System:** A CR10X data logger reads the sensors continuously. The logger is linked to the control house or office by direct cable or telemetry.

**Data Processing:** Campbell Scientific's LoggerNet software retrieves readings from the data loggers. Slope Indicator's Argus software processes the readings and makes them available on the web.

## System Features

- Continuous, unattended monitoring with immediate processing of data.
- Three alarm thresholds for differentiating warnings of trouble.
- Shows site activity in section view or plan view.
- Shows real time profile of the track and real time settlement or elevation values at each sensor.
- Shows twist values, based on customer-defined criteria for set lengths of track.
- Shows 5-day trend graphs for any sensor.
- Telescoping sockets and robust construction allow track to be lifted for reballasting.

## Installed Systems

**Brig, Switzerland, 1993:** 20 sensors.

**Manchester Light Railway, UK, 1994:** 20 sensors.

**Bradford and Ilkely Railway, UK, 1994:** 25 sensors.

**Tunnel du Sauges, Switzerland, 1995:** 42 sensors.

**Autoroute du Rhone, Switzerland, 1995:** 24 sensors.

**Boston Artery Trials, USA, 1996:** 65 sensors.

**Birmingham-Gloucester Line, UK, 1997:** 120 sensors.

**Gare du Nord, France, 1997:** 63 sensors.

**CN Rail, Canada, 1997:** 16 sensors.

**Singapore MRT, 1998:** 87 sensors.

**North Rode-Macclesfield, UK, 1999:** 70 sensors.

## References

A prototype of the jointed-track system was tested and documented in a report for the Boston Artery project by Bechtel-Parsons Brinckerhoff.

The continuous-track system was tested on the Birmingham-Gloucester Line in the UK and documented in a report by Jarvis Facilities Ltd.

A safety report prepared in the UK shows the system does not generate electrical noise that could interfere with railway signaling systems.

**TRACK SETTLEMENT SENSORS**

Track Settlement Sensor . . . . .96806350  
 Tubing, 3m / 10 ft . . . . .16804250  
 End-Anchor for Sensor String . . .96806351

Rugged, uniaxial EL track settlement sensor is supplied with heavy-duty mounting plate, swivel, and sockets for connecting stainless steel tubing. Telescoping socket allows track to be lifted for reballasting. Does not include signal cable or tubing.

Each sensor is connected to the next stainless steel tubing. Tubing is supplied in nominal 10 ft / 3m lengths.

Gauge length of final sensor is terminated by an end-anchor.

**Calibrated Range:**  $\pm 10$  degrees.

**Resolution:** 0.0024° or 0.04 mm/m using 13 bit readout device such as the CR10X data logger.

**Precision:**  $\pm 0.006^\circ$  or  $\pm 0.1$  mm/m, as achieved in actual field applications.

**Calibration:** 11 point calibration taken at five temperatures from 4 to 20 °C.

**Materials:** Steel and brass.

**TRACK TWIST SENSORS**

Track Twist Sensor . . . . . 96806450

Rugged, uniaxial EL twist sensor is supplied with brackets that bolt to the tie. Does not include signal cable.

**Calibrated Range:**  $\pm 10$  degrees.

**Resolution:** 0.0024° or 0.04 mm/m using 13 bit readout device such as the CR10X data logger.

**Precision:**  $\pm 0.006^\circ$  or  $\pm 0.1$  mm/m.

**Calibration:** 11 point calibration taken at five temperatures from 4 to 20 °C.

**Materials:** Steel.

**INSTALLATION ACCESSORIES**

Signal Cable . . . . .50613527

Signal cable is required for both local and remote readout. Shielded cable with seven 22-gauge tinned-copper conductors and polyurethane jacket. Cable is attached at factory.

**READOUT**

EL Data Recorder . . . . .56813500

This readout displays and stores tilt readings in volts and temperature readings in degrees C. Includes software for transferring stored readings to a Windows PC.

**DATA LOGGER**

Campbell Scientific data logger. Up to 16 sensors can be connected to each AM16/32 multiplexer.

**ARGUS MONITORING SOFTWARE**

See separate data sheet for details.