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Installation Manual

Model 6005

Spiral Sensors

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1. Introduction

The Model 6500 Inclinometer Casing is used with the Model 6000 Inclinometer Probe. It has four grooves oriented @ 90 degrees designed to guide the wheels of the probe and keep them oriented in a known direction. The casing may become twisted during installation. This is more likely the longer the casing. In the following will be found descriptions of two kinds of spiral sensors, mechanical and electronic, and how they can be used to perform a spiral survey of the inclinometer casing grooves. The information from the spiral survey can be entered into spreadsheet software, so that directions of maximum tilt or inclination can be correctly oriented at any point along the casing.

2. Spiral survey using the mechanical spiral sensor Model 6005-1

The Model 6005-1 Spiral Sensor is shown in figure 2. It comprises a flat plate that is designed to fit in opposite grooves of 2.75" (Model 6500) Inclinometer Casing. To this flat plate are attached sectional orientation rods that enable the plate to be positioned at any depth within the casing. A pointer attached to the orientation rods is positioned over a protractor scale clamped to the top of the casing and reveals instantly the orientation of the casing grooves, at the position of the flat plate, relative to the grooves at the top of the casing. This amount of spiral is noted and entered into the appropriate software program.

A 1/16th" braided, plastic coated aircraft cable, attached to the flat plate can be used to lower and raise the plate and orientation rods inside the casing.

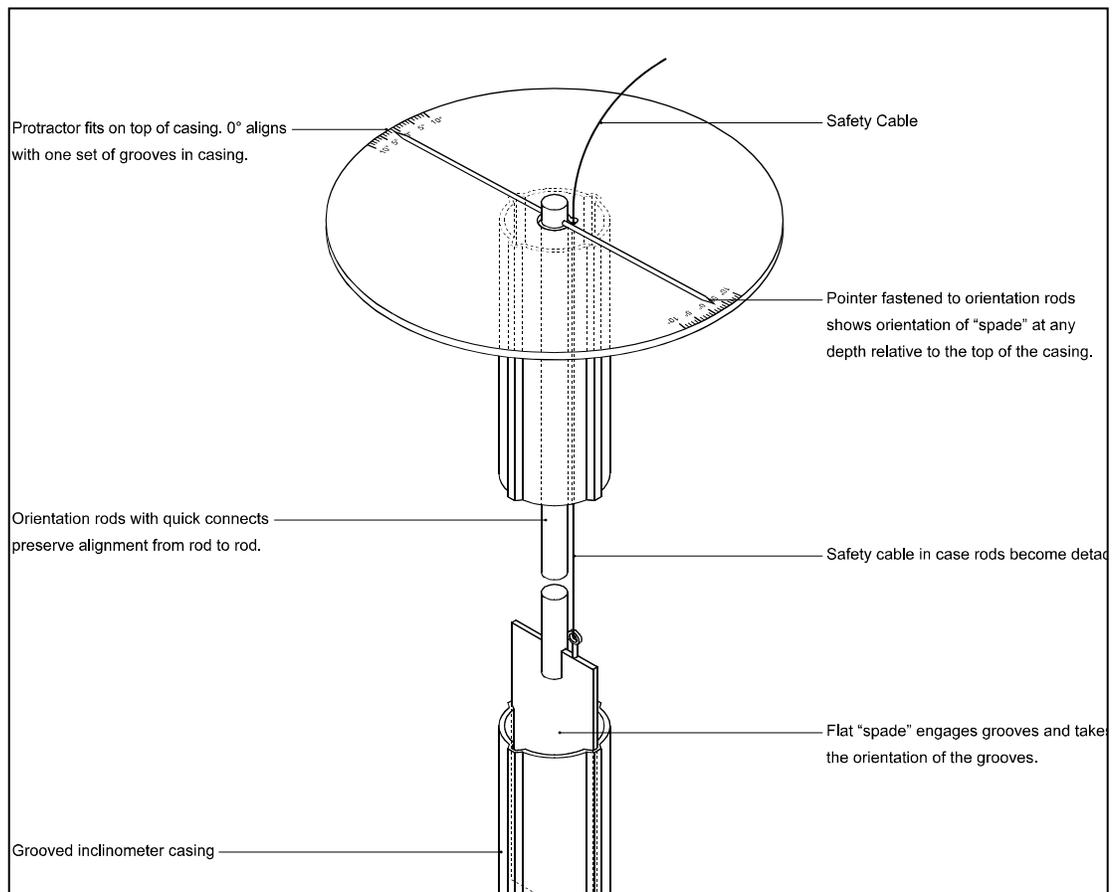
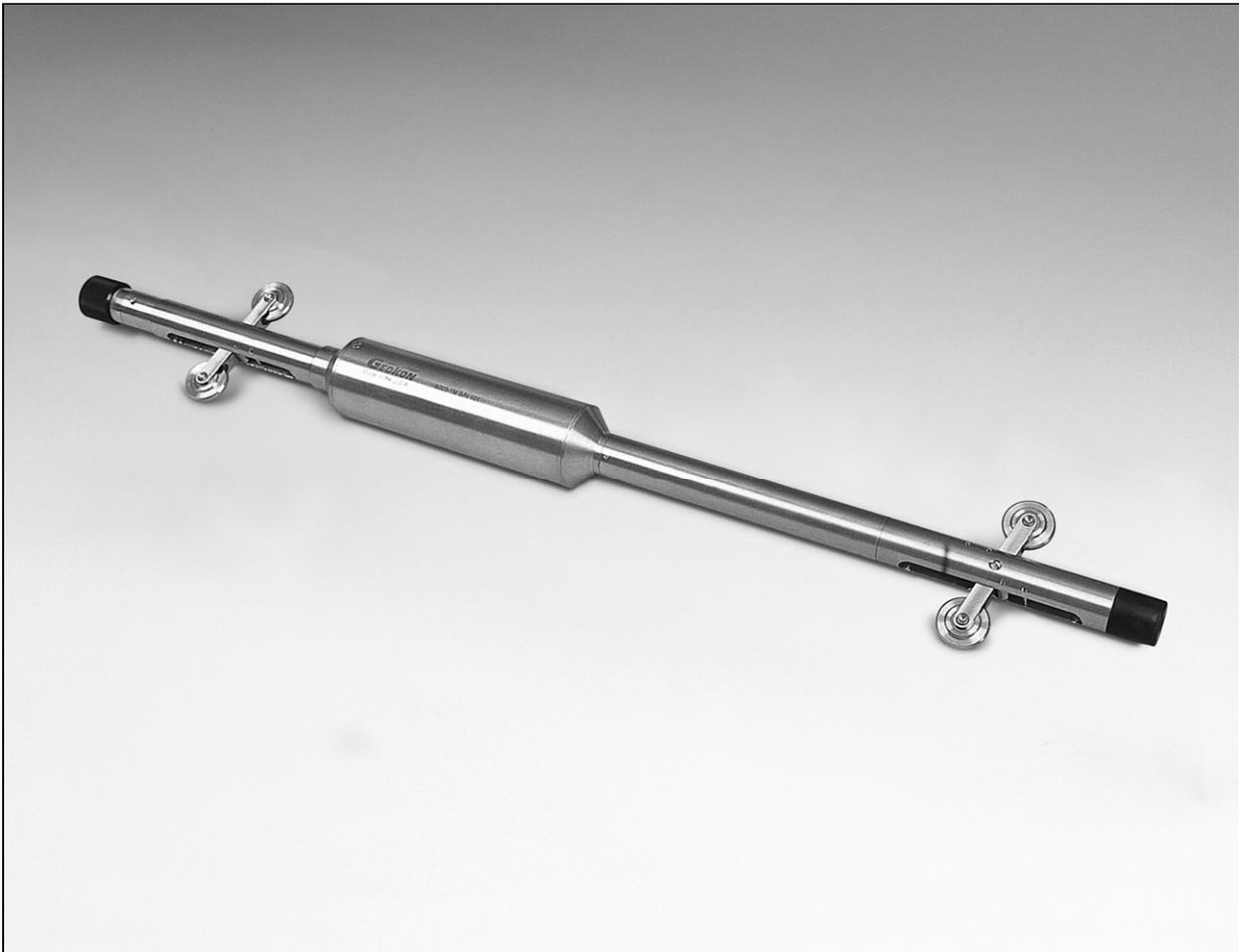


Figure 2 Mechanical Spiral Indicator

3. Spiral survey using the electronic spiral indicator probe Model 6005-3

The Model 6005-3 Spiral Indicator, shown in figure 3, is designed to be used in conjunction with the standard inclinometer cable (Model 6000-4) and with the Model GK-603 Inclinometer Readout Box.

The probe is lowered down the casing on the cable with the upper-most wheel in the A+ groove and a reading is taken using the GK-603 Readout Box at measured intervals along the casing.



3.1. Sensor details or Borehole requirements

The sensor contains a microprocessor controlled fluxgate compass with an accuracy of $\pm 0.5^\circ$ over a tilt range of $\pm 16^\circ$. *Note that this Spiral Indicator will not work in a steel cased borehole nor in situations where steel is present in the form of I beams, rebar, angles and channels etc. and is at distances of less than about one foot from the Spiral Indicator (or farther where the amount of steel is greater, or is oriented in an unfavorable direction.)*

3.2 Readout Procedure

3.2.1 GK-603 Set-up

The GK-603 readout box is set-up as follows:

- From the main menu select Option 5 - System Settings
- Now select Option 4 - Configure Probe
- Now select Option 1 – Compass
- Now select Option 3 - A-Axis zero shift and set the reading to + 1000

- Now escape to the Reading Screen and continue your setup in the usual manner. The display in the Reading Screen for channels A and B now includes a decimal point. The normal range of display for A and B is 0.0 to +360.0, indicating degrees. The B channel reading is calculated by adding 90° to the A channel compass measurement.

3.2.2 Preliminary Checks

With the probe connected to the GK-603, and held more or less vertical twist the probe through one full revolution. The reading on the A-axis should go from zero degrees to 360.0 degrees then back to zero. With long Inclinometer cables there can be some voltage loss in the cable such that the maximum reading may be less than 360.0 degrees. If this occurs then a correction can be made using the A-axis Gage Factor option. Select this option. If, say, the maximum reading is only 350 degrees then toggle in an A-axis gage factor equal to 1.029 (360/350). Now recheck the probe output and verify that the reading varies between 0 and 360 degrees.

3.2.3 Reading Procedure

Now return to the 'Take Readings' screen and take readings at 0.5m (2 feet) intervals beginning at the bottom of the casing (or at the top if preferred). Store all readings in memory.

3.4. Analysis of the data

Data stored in memory may be transmitted to a computer following the instructions of the GK-603 manual. Analysis of the data may be performed using spreadsheet programs to produce a plot showing the A groove orientation with depth. Depending on the magnitude of the twist the operator must then decide whether a correction is needed to the measured borehole deflections. Spirals less than 5 degrees may safely be ignored. Even 10-degree spirals have little significance.