Parallel Seismic (PS) systems are designed to determine the length and integrity of foundations when the top is not accessible or when the pile is too long and slender to test with echo techniques, or below a buried pile cap. Ultimately, Parallel Seismic testing provides information concerning the length and compressional velocity of foundations and can be used on concrete, wood, masonry, and steel foundations. This method also provides information about the soil below the foundation bottom. It should be noted that this test method requires the installation of a water-filled or grouted cased borehole.

Features
- System design allows for fast and accurate field measurements - depth accuracy can be determined within 5% or better
- More economic and versatile than other equipment/techniques used for determination of unknown foundation depths
- Method and system allows for testing of piles without excavation
- System is compact, durable, and easily transported, allowing for multiple tests per day
- IX Foundation, a seismic analysis and display program allows the full range of data to be viewed at one time, improving the ability to identify the foundation bottom
- Test piles that are partially/totally submerged
- Determine the tip depths of foundations with complex geometries such as piles under pile caps

Table: Model Advantages

<table>
<thead>
<tr>
<th>Model</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS-1 Model</td>
<td>Hydrophone in water-filled, ungrouted cased borehole</td>
</tr>
<tr>
<td>PS-1G Model</td>
<td>Hydrophone and triaxial geophone for grouted, cased borings and downhole seismic velocity measurements of soil and rock</td>
</tr>
</tbody>
</table>

When access to the top of the foundation is limited, the Parallel Seismic test is more accurate and more versatile than other nondestructive surface techniques for determination of unknown foundation depths.
**Method**

The PS method is typically performed in a cased borehole of 2 inch I.D. (50 mm) or greater which is placed in the proximity of the foundation in question. The test can also be performed using a Cone Penetration Test Rig in soft soil environments with a special small diameter hydrophone for 1 inch I.D. (25 mm) casing.

**Data Collection**

The user friendly PS software is written and tested at Olson Instruments’ corporate office in Colorado. We do not outsource any tech support questions and, should you require software support, we welcome your questions and comments. It should be noted that PS data is usually displayed and analyzed in a program called IXFoundation® created by Interpex Limited.

**Available Models**

The Parallel Seismic system is available in two different models which can be run from Olson’s Freedom Data PC or NDE 360 Platforms:

1. Parallel Seismic - 1 (PS-1)
2. Parallel Seismic - 1G (PS-1G)

The **PS-1 Model** is the base model and is most frequently used for shorter piles, with a 3 lb instrumented hammer as the source and a hydrophone receiver. As a general rule, the longer the pile, the larger the required hammer.

The **PS-1G Model** includes a hydrophone and a triaxial geophone which can be used for PS and downhole seismic testing. This system can be used to test a wider distribution of pile lengths with a heavier sledge hammer used as the source.

The **PS-1 + SE/IR-1 + US-1 Models** combine Parallel Seismic (PS) with Sonic Echo/Impulse Response (SE/IR) and Ultraseismic (US) for complete foundation testing at a reduced price because the systems share many common components.