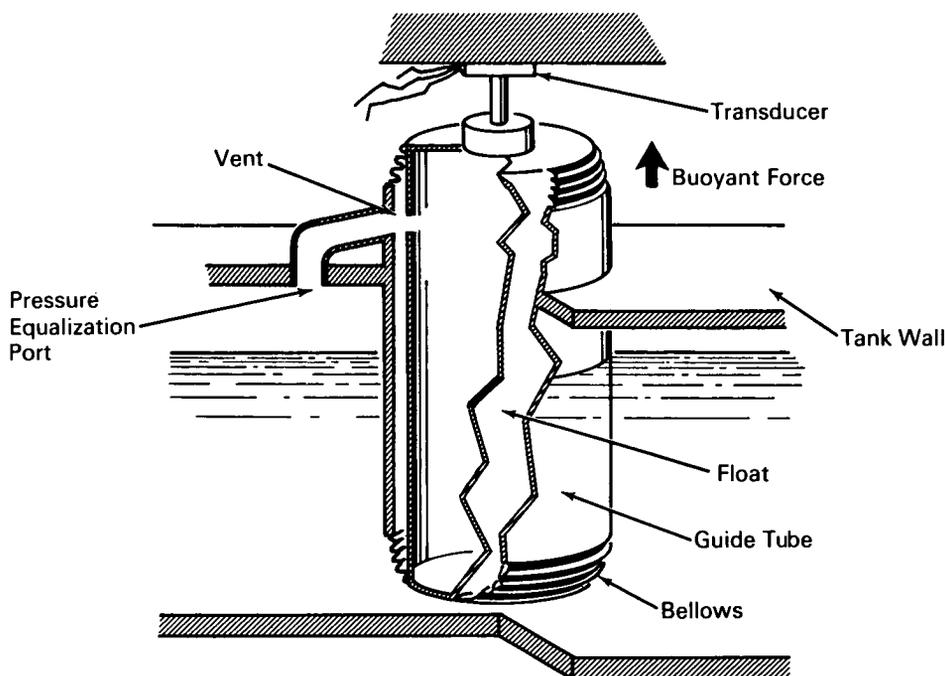


# NASA TECH BRIEF



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## Device Without Electrical Connections in Tank Measures Liquid Level



### The problem:

To measure the liquid level in a tank without any electrical connections inside the tank. The level-measuring system must be insensitive to tank pressure and temperature changes.

### The solution:

A vertical static float in the tank that transmits the buoyant force of the liquid to an external force transducer.

### How it's done:

The static float is housed inside of a guide tube which is welded to the tank wall. The float is held in the guide tube by means of isolating bellows at the

top and bottom. The force transducer is mounted above and in contact with the upper bellows.

Since the float is displaced only a small amount equal to the displacement of the force-summing member of the transducer, the level of the liquid in the tank is proportional to the buoyant force acting on the float, which is transmitted to the transducer. The transducer is connected in an electrical circuit which gives an output signal proportional to the liquid level.

The lower bellows has a spring rate at least an order of magnitude less than that of the upper bellows. This difference in spring rates is to allow the thermal expansion of the float to be in the downward direction rather than against the transducer.

(continued overleaf)

**Notes:**

1. The internal components of this device can be made of materials that will be compatible with various liquids over a wide range of operating temperatures. The device is insensitive to tank pressure, and since it has essentially no moving parts, it can be used where high reliability and longevity are necessary.
2. The static float could also be connected to a dial indicator when a visual indication of liquid level is desired.

**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)), to the V. K.C. Aerojet-General Corporation, Azusa, California.

Source: J. S. Shenkman  
of V.K.C. Aerojet-General Corporation  
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