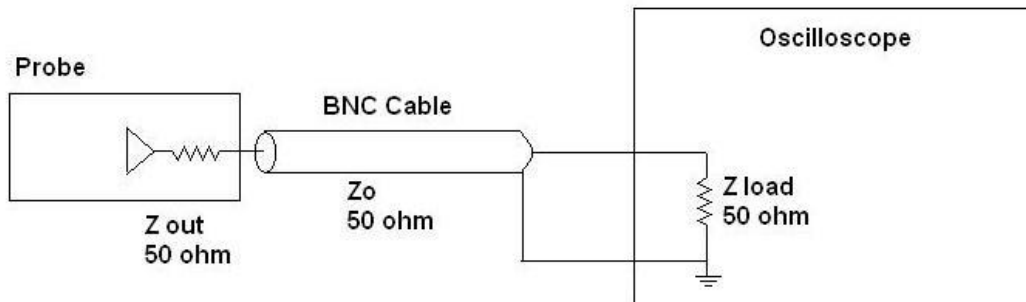


## Q: Impedance Matching

An important factor about the “Impedance Matching” concept is that it must take into account of the media/cable that is transmitting the signal. For the BNC cable it has characteristic impedance ( $Z_0$ ) of 50 ohm. Adapting the transmission line theory, to achieve best quality of signal transmission, the impedances should be the same to all the media across the transmission, including the output impedance of the probe, characteristic impedance of the transmission cable, and the input impedance of the scope.

Please see the illustration below.



note: The transmission line acts like

to seal the electrical fields inside the cable, which is important for high frequency transmission

This setup is particularly important for the high frequency signal transmission to prevent signal distortion and reflection.

However, for the lower frequencies of signal transmission, the reflection caused by the mismatching of the load only affects the signals beyond the concerned bandwidth. That is why the probes can work well with oscilloscopes adapts an input impedance of 1M ohm// 20pF. The transmission line at low frequencies transmission behaves like a shorted wire. Therefore, the output impedance of the probe and the input impedance of the scope act like a voltage divider, the measurements are illustrated by the diagram below.