

Application Note APNE-0003

Fieldmeter Measurement Techniques Using Monroe Electronics Model 1036 Probes

Monroe Electronics Model 1036 fieldmeter probes are calibrated (or, more correctly, "standardized") in a true uniform or homogeneous field. The calibration fixtures used are designed to produce parallel field lines.

As a true uniform field does not usually occur in most practical measurement situations, partly due to the introduction of the grounded probe itself, one must either:

1. Attempt to better the geometry by establishing a grounded plane, through which the fieldmeter probe can view the field under consideration,
2. Establish a correction factor for the data, or
3. Accept relative data. In many cases, this is perfectly acceptable practice once a fixed geometry is established.

Some guidelines are offered here.

During the standardization procedure, these probes are configured as shown in Figure 1 with the face of the probe flush with the bottom of the upper metal plate or "shroud" which is referenced at ground potential. This shroud effectively increases the area of the face of the probe. It and the surface under test (in this case, gradient plate) can be considered to be infinitely large as long as the size of the plates exceeds 5 or 6 times the distance between the plates.

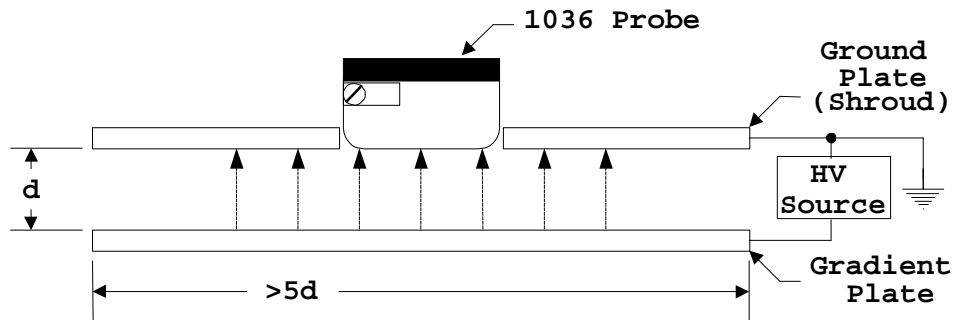


Figure 1

Please note that the diameter of the face of the Model 1036F probe is approximately 1½ inches. The face of the Model 1036E is 4¼ inches by 2¾ inches. Either probe type used on its own without a shroud will tend to perturb a field as shown in Figure 2.

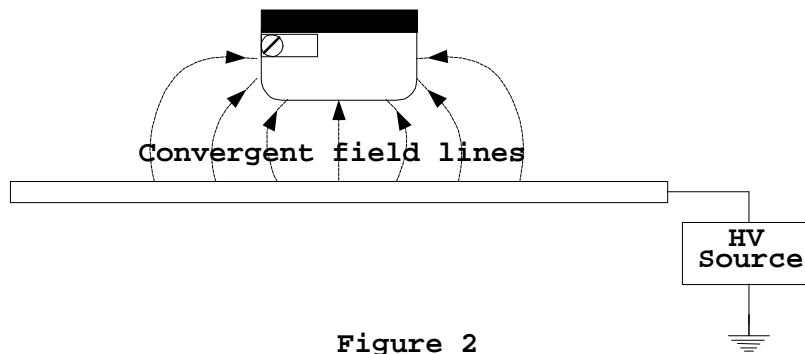
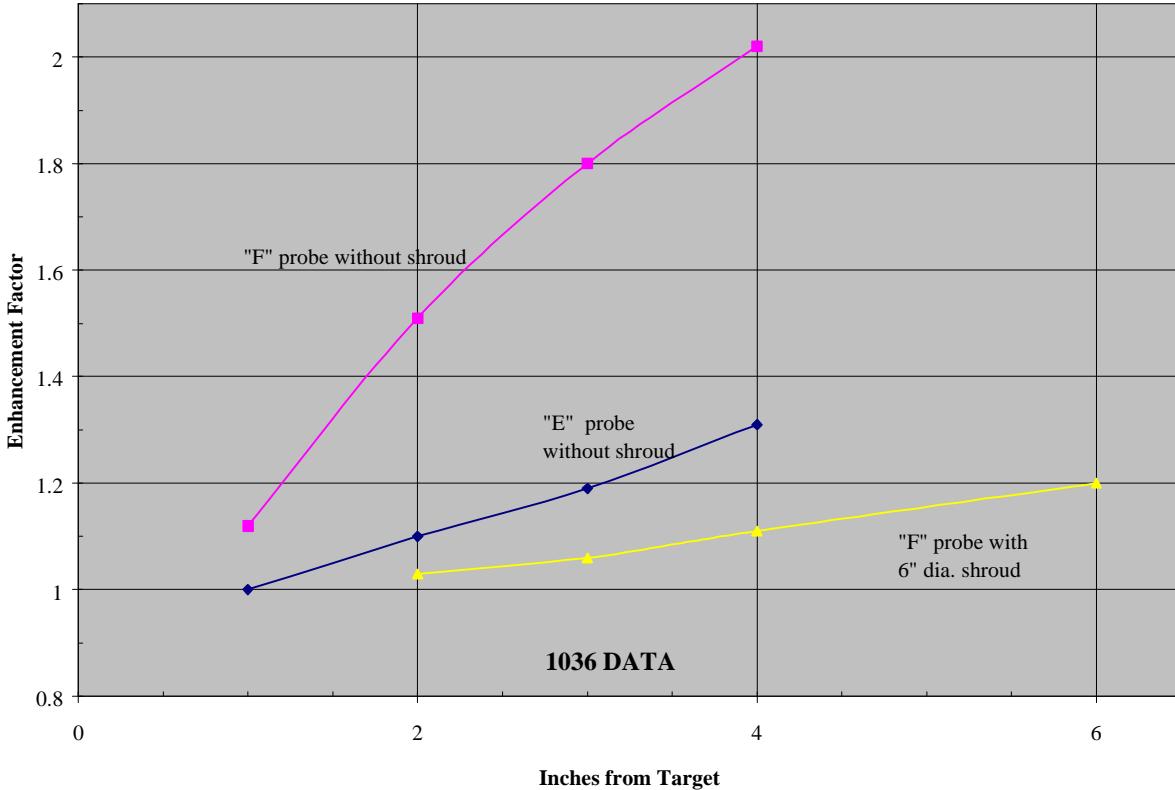


Figure 2

Convergent field lines such, as these tend to "enhance" the measurement and cause the apparent field strength to increase, thus producing a high reading. Although this may be relatively inconsequential where a direct measurement of surface voltage is desired — for example, where a probe whose specified sensitivity is 10kV/cm is being used at 1cm to produce an indicated full scale value of up to 10,000 volts — given a large enough surface and a properly sized shroud, that same probe could be used to produce a measurement of surface voltage up to 100,000 volts at 10cm with fairly good accuracy.

Tests performed in our laboratory produced the following:



Some conclusions may be drawn from the data shown in Figure 3:

1. An "F" probe produces a reading about 12% high with no shroud at 1" (25mm) and about double at 4" (100mm).
2. When provided with a 6" diameter shroud, the error drops to fewer than 10% at spacings of up to almost 4".
3. A shroud is unnecessary on an "E" probe at 1" or less and would produce the same improvement as with the "F" probe at greater spacing.
4. As a general rule of thumb, a shroud (or the size of the face of the probe) should be about 1½ times the spacing to keep errors to about 10% or less.