



Instruction Sheet

703 Static Meter

Description

The 703 is an electronic instrument that will indicate the quantity and polarity of the voltage due to a static charge without contacting the surface. It is completely self-contained and uses standard 9V transistor batteries as a power source.

Theory Of Operation

General

The Model 703 is a field strength meter, i.e., it measures the strength of the electric field generated by a static charge. The electric field induces into a grid, located in the tip of the meter, a charge that is proportional to the charge being measured.

Induction is the process where a static charge appears on the surface of an uncharged object due to the close proximity of another charged object. This is what happens when a hard rubber comb carrying a negative static charge approaches human hair — a positive charge will appear on the hair. This induced charge is generated without contact, and will remain only as long as the hair and the comb are in close proximity.

Measuring Element

There are three sections to the measuring element — a grid, ionizing source, and high impedance amplifier.

The function of the grid is to receive the induced charge from the electric field. This may be positive or negative depending on the polarity of the charged surface.

The ionizing source is a tritium foil (H_3) which causes the air space between the grid and the amplifier to become electrically conductive. The ionized air allows a small current to flow from the grid to the amplifier. This signal is translated by the amplifier into the magnitude and polarity of the voltage due to the charge on the object being measured and is displayed on the meter face.

Distance

Since the strength of an electric field decreases with distance, the output of the meter should be in volts per inch or volts per centimeter. This is a difficult parameter to visualize; therefore, three

specific distances were chosen and the meter dial was calibrated in volts at these distances. A further discussion of these distances will be given in the section on meter adjustments.

Operating Procedure

The operator holds the 703 in the manner of a gun and depresses the trigger to activate the meter. The trigger must be depressed during measurement and the meter should be adjusted for zero as outlined below. With the trigger still depressed the meter is aimed at the surface being measured, taking care not to over-range (peg) the meter by moving too close to a highly charged surface. The spacing between the object and the tip of the instrument determines the full scale sensitivity. The reading of the meter indicates both the voltage level and the polarity (+ or -) of the charged surface.

Principle Of Operation: The charge on the surface being measured is induced onto an internal element of the meter. This is detected by using a nuclear source and a high resistance voltage measuring element. The signal is displayed on a tri-scale meter. The voltage read on the 703 is the potential difference between the object under test and ground, provided the operator is grounded.

Meter Adjustments: Since the 703 will read both positive and negative voltages, the zero point is the center of the meter face. Before making a measurement the zero should be checked by turning the meter on and adjusting the black knurled knob above the meter face. During this adjustment the opening in the tip of the meter should be aimed at an open space away from any charged surface. The scale that is read while making a measurement depends on the distance between the charged surface and the tip of the meter. The top scale is used at a distance of 2", the middle scale at 6", and the lower scale at 12" from the object being measured. To change the range of the meter, increase or decrease the size of the opening by adjusting the aperture. The full scale readings are as follows:

	Aperture Setting		
	10X	1X	1/10X
Top Scale	50KV	5KV	0.5KV
Middle Scale	100KV	10KV	1 KV
Lower Scale	200KV	20KV	2 KV