INSTRUCTION MANUAL

FIELD SERVICE ELECTROSTATIC VOLTMETER

MODEL 235J S/N _____

MODEL 96025-15 S/N _____

MODEL 3415 S/N _____

REV 6/85 P

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SECTION 1

SPECIFICATIONS

A. APPLICATIONS:

The 235J portable electrostatic voltmeter is a stable reliable instrument which measures electrostatic surface potential of conductive or insulating materials without physical contact to the measured surface. The small size and light weight make it an ideal field service instrument.

B. FEATURES:

- Accuracy essentially independent of probe-to-surface separation.
- Sealed probe for reliable operation in the presence of toner or other contamination.
- Compact, light weight.

C. RANGE:

0 +1000VDC

Meter ranges of 0 to +100V and 0 to +1000V.

D. STATIC ACCURACY:

2% of full scale including noise and drift.

E. SPEED-OF-RESPONSE:

Unit internal gain control is factory adjusted for optimum response at 1/8".

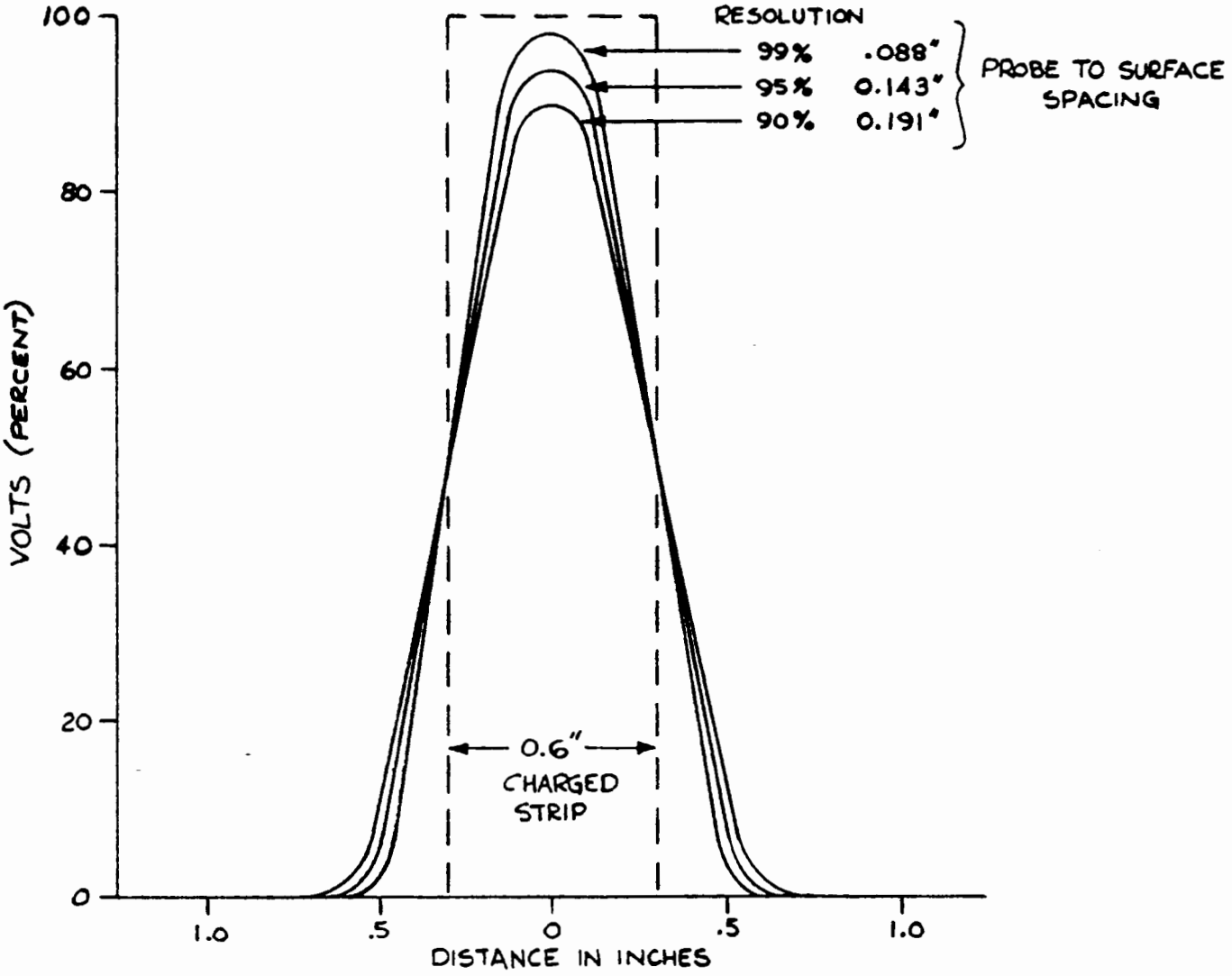
Approximately 1.3 seconds (meter)
100 msec optional output jack.

F. SURFACE RESOLUTION:

1. Approximately 0.6" diameter spot.*
2. Strip resolution vs probe-to-surface spacing is indicated on graph #1.

G. SPACING DEPENDENCE:

Zero sensitivity to probe-to-surface spacings from 1/16 to 1/4" is less than 4V, when zeroed at 1/4", typically



RESOLUTION MODEL 96025-15 PROBE

FIG. #1

shown in graph #2.

H. POWER INPUT:

115, 230 volts a.c. +/-10% switch selectable on 235J-1, 50-60Hz. Less than 10 watts.

The operating voltage is factory pre-set on 235J-2.

I. PROBE DIMENSIONS & MOUNTING:

Probe: Model 1016 type. 1 1/8" diameter x 1 1/8" high, side connected 3 foot cable.

Mounts through a 5/32" (4.1 mm) hole or slot and thumb wheel, in the center of the back side of the probe.

J. DIMENSIONS AND WEIGHT:

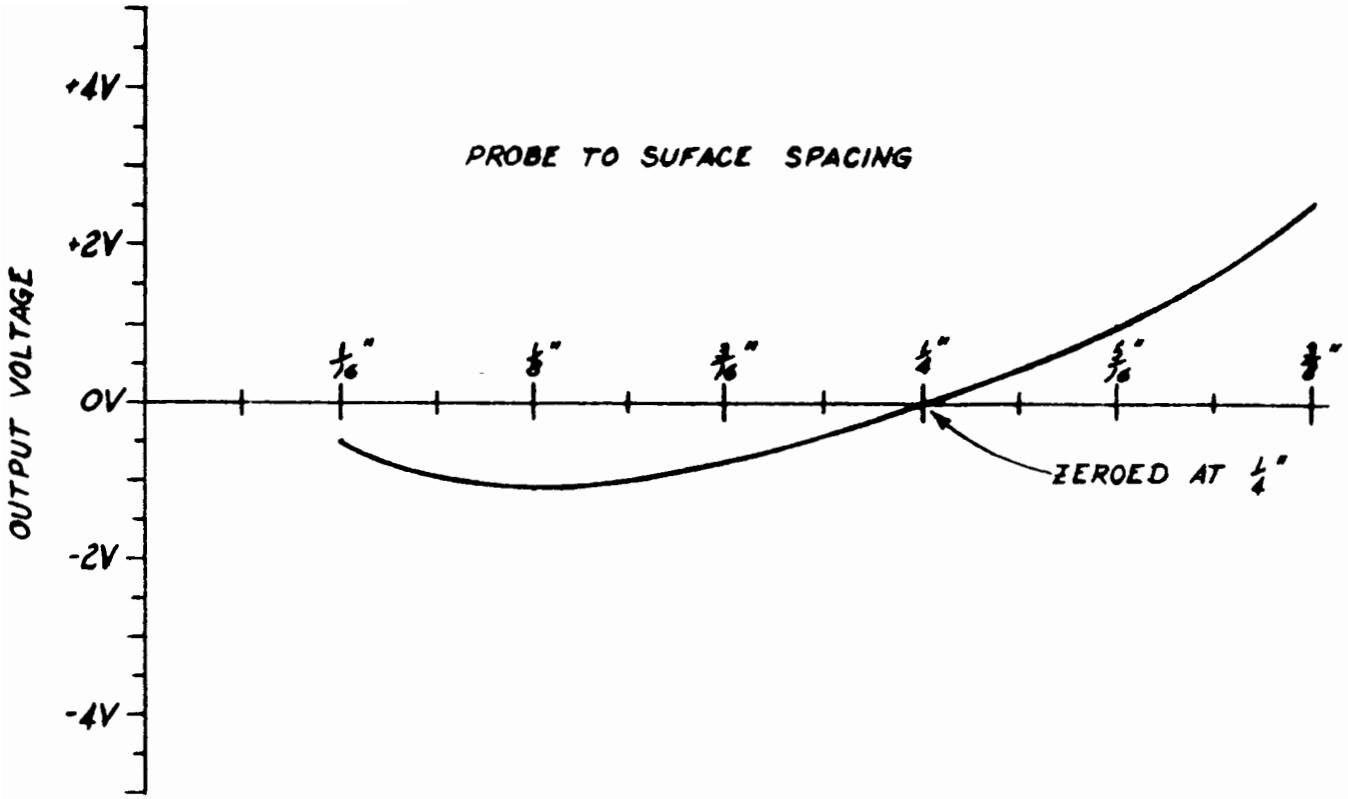
10" X 7 1/2" X 3 3/4", with carrying handle, 4 lbs.

K. OPTIONS:

In addition to the 0 to +1000 DC range, this instrument can be supplied with ranges of:

0 to - 1000 VDC
- 1000 VDC to + 1000 VDC
0 to + 2000 VDC
0 to - 2000 VDC

Additionally, meter ranges can be selected to suit specific needs.



SPACING DEPENDENCE

FIG. # 2

SECTION 2

INSTALLATION

A. DETECTOR, 96025-15 PROBE:

The probe must be mounted in close proximity and parallel to the surface whose potential is being monitored. Probe-to-surface spacing should be between 1/16" and 1/4". Speed-of-response, surface resolution, accuracy and noise are functions of probe-to-surface spacing and should be considered when selecting it, Figures #1, 2.

> Note: Caution should be observed that no metal objects touch the metal portions of the probe when the system is operating. These surfaces may be at voltages exceeding 1.5KV.

B. GROUNDING SYSTEM:

The instrument is normally grounded via power cord.

SECTION 3

OPERATION

With the probe mounted as indicated in section 2, the unit may be operated as follows:

A. METER RANGE SWITCH:

Set to range desired or 1000 V if range unknown.

B. POWER SWITCH:

Switch on.

C. ZERO:

1. Place probe approximately 1/8" above metal surface under test with meter range on 100 V F.S.

2. Adjust zero for zero out. Move probe close to the surface approx. 1/16", the output should remain at zero.

Note: If the instrument's output is not zeroed at ground, the instrument will be spacing dependent.

D. GAIN:

The gain is factory adjusted for critically damped response at 1/8" probe-to-surface spacing. The internal gain control will normally not require adjustment.

Spacings less than 1/16" may cause a sustained system oscillation, resulting in a decreased accuracy.

E. PROBE CONTAMINATION:

If the probe collects contaminates the instruments drift and noise will increase. It may also result in excessive zero offset which cannot be corrected by the zero control.

To correct this, the probe should be cleaned by spraying the probe face with a suitable aerosol solvent (ex. Miller Stephens MS180 degreaser). Care should be taken not to spray this in the venting ports around the edges.

THEORY

A. BASIC PRINCIPLE: (Refer to fig. #3)

The sensitive electrode is the 1/2" diameter vibrating metal plate which forms the major portion of the "sensing" side of the Model 96025-15 Probe.

During a measurement, an AC signal is induced on this vibrating electrode. The amplitude of this AC signal is proportional to the excursion path length of the electrode, and the potential difference between the electrode and the surface to be measured. Phase is determined by the polarity of this potential difference.

This mechanically modulated signal and a reference signal from the oscillator are fed to a phase sensitive demodulator whose output DC amplitude and polarity is dictated by the amplitude and phase of the electrostatically induced AC signal relative to the reference signal. The output of the demodulator feeds a high level integrating amplifier whose output polarity is the same as the surface to be measured. The output of this integrating amplifier is fed directly to the sensitive electrode and other metal parts of the probe.

As the voltage on the probe approaches the same value as the voltage on the surface under measurement, the electric field between this surface and the probe approaches zero, and the output of the integrating amplifier stabilizes at a value just sufficient to maintain a null. By simply metering this output, one has an accurate indication of the potential of the surface under test.

This feedback principle and "null seeking" operation combine to make a remarkably stable and accurate instrument.

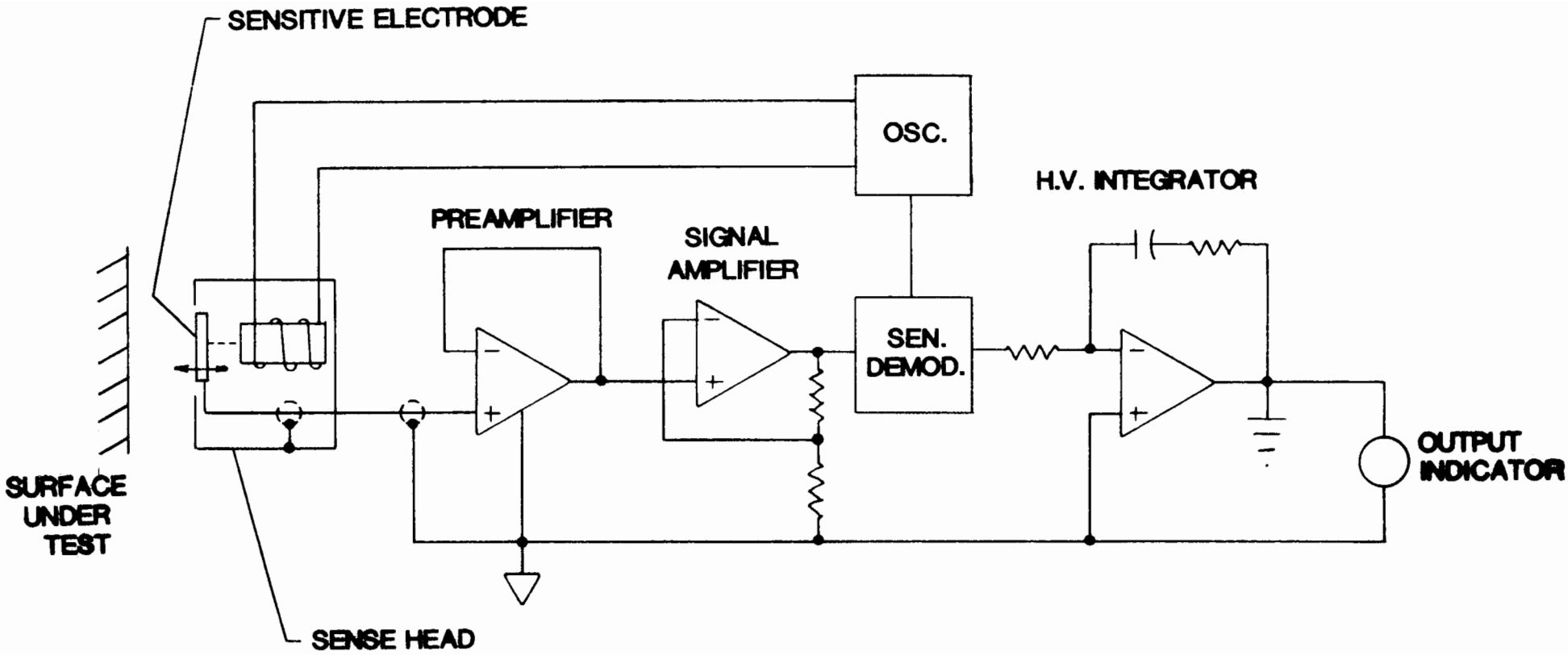


Fig. #3

Model 235J Electrometer
Block Diagram

SECTION 5

CALIBRATION

A. GENERAL:

The mode exhibits excellent stability but a calibration check at 6 month intervals is recommended. Before calibration, allow instrument to stabilize for 30 minutes at 25 +/-3 degrees centigrade.

Note:

1. For all adjustments use insulated screw drivers, potentiometers can assume voltages of 1.5KV.

2. Probe-to-surface spacings measurements are made to the flat portion of the probe.

B. SUGGESTED EQUIPMENT FOR CALIBRATION:

1. 0.2% 1KV reference supply, Range 0 V to 1KV.

2. Adjustable fixture for varying probe-to-surface spacing.

3. Oscilloscope with 10 megohm input impedance.

C. INTERNAL ADJUSTMENTS:

1. Gain

   A. Place probe 1/8" probe-to-surface spacing in accordance with section 2.

   B. Ground surface plate to ground.

   C. Turn unit on, allow to stabilize to room ambient for a minimum of 15 minutes.

   D. Connect scope to TP5 and ground, TP6.

   E. Adjust the GAIN "R7" so that the full range of ZERO adjustment is 80 volts (i.e., -40 to +40mV measured at TP5 and TP6.

      After the GAIN has been set, with the surface-under-test at 0V, adjust the ZERO for 0V (0mV) output.

2. Meter Calibration

   A. Turn instrument off wait 5 minutes, adjust

mechanical zero.

B. Set probe-to-surface spacing at 1/8".

C. Turn instrument on, allow to stabilize.

D. Ground surface plate, zero on 100 V range.

E. Set range switch for 1000 V F.S.

F. Apply +1000 V DC +/-0.2%, adjust "R-26", meter cal, for full scale.

G. Set range switch for 100V F.S.

H. Apply +100 V DC +/-0.2%, adjust "R-24", meter cal, for full scale.