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QUALITY ASSURANCE DOCUMENT

PROCEDURE FOR THE CALIBRATION OF  
MODEL PAC-1SAG ALPHA  
SURVEY METER

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PROCEDURE FOR THE CALIBRATION OF  
MODEL PAC-1SAG ALPHA  
SURVEY METER

1.0 Scope

This document describes the procedures for the calibration of the Eberline PAC-1SAG Alpha Survey Meter.

2.0 References and Standards

- 2.1 Technical Manual for Scintillation Alpha Counter Model PAC-1SAG
- 2.2 Hewlett Packard 3465A or its equivalent--calibrated annually with a General Radio Model 1822 Digital Multimeter calibrator.
  - 2.2.1 The calibrator is returned annually to General Radio Service Facility for recalibration which is traceable to the National Bureau of Standards.
- 2.3 Plated  $^{239}\text{Pu}$  alpha standards checked annually according to procedure IL-CP-134.
- 2.4 Rawsen Electrostatic Voltmeter--calibrated annually using procedure IL-CP-175.
- 2.5 Medium-level  $^{137}\text{Cs}$  source calibrated annually in accordance with procedure IL-CP-132. <sup>33</sup>
- 2.6 Encapsulated  $^{60}\text{Co}$  low-level source--calibrated semi-annually as per procedure IL-CP-159.

3.0 Inspection and Cleaning Procedure

- 3.1 External Visual Inspection
  - 3.1.1 Inspect instrument case for external damage.
  - 3.1.2 Clean case.
  - 3.1.3 Clean meter face using "Stat-nul".
  - 3.1.4 Inspect probe face for damage to mylar window. In the event light leaks are found, seal the holes with a black lacquer.
  - 3.1.5 Check the probe window for light-tight integrity using sunlight if available or a high-intensity lamp. If additional light leaks are found repair as in step 3.1.4.

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3.1.6 Inspect probe cable for evidence of wear or damage and repair as needed.

3.2 Internal visual inspection

3.2.1 Inspect internal components for physical damage.

3.2.2 Test batteries and replace as needed.

3.2.3 Clean battery contacts using 600 grit paper.

4.0 Calibration Procedure and Adjustment

4.1 Voltage measurements.

4.1.1 Measure the voltage across CR-2 in Manual Fig. 5-1, attached. The voltage should be  $5.8 \text{ Vdc} \pm 0.1 \text{ V}$ . If not, recheck batteries and repair as necessary.

4.1.2 Set the range switch S-1 to the X1 range. (See Manual, Fig. 5-1.)

4.1.3 Using the Rawson Electrostatic voltmeter, measure the output of the high voltage power supply. The voltage should be  $1240 \text{ V} \pm 5 \%$ . If not, repair as necessary until high-voltage is within specifications.

4.1.4 Set the range switch, S-1, in Manual Fig. 5-1, attached, to the 0-2 R position.

4.1.5 Using the meter as in step 4.1.2, measure the high-voltage at the Geiger-Mueller tube. The voltage should be  $950 \text{ V} \pm 10 \%$ . If not, repair as necessary until the voltage meets the specifications.

5.0 Discriminator Adjustment

5.1 Using a low-intensity gamma source,  $^{60}\text{Co}$ , place the round portion of the alpha probe in a 500 mr/hr gamma field. Adjust the discriminator until the meter indicates  $<100 \text{ c/m}$ .

5.2 In the event this low level of counts cannot be obtained, check the probe face for contamination or a noisy photomultiplier tube.

5.3 Repair as necessary and repeat adjustment of the discriminator as in step 5.1.

6.0 Alpha Calibration

6.1 Using the  $^{239}\text{Pu}$  standard (WJ 817600) calibration set, adjust each range in the upper 50 % to the correct readings within  $\pm 5\%$  of the indicated disintegration rate of the standard source.

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- 6.2 Use the standard (WJ 817610)  $^{239}\text{Pu}$  sources to check the instrument response in the lower 50 % of each range.
- 6.3 In the event these readings cannot be obtained, repair as necessary and return to step 6.1 and repeat adjustments.

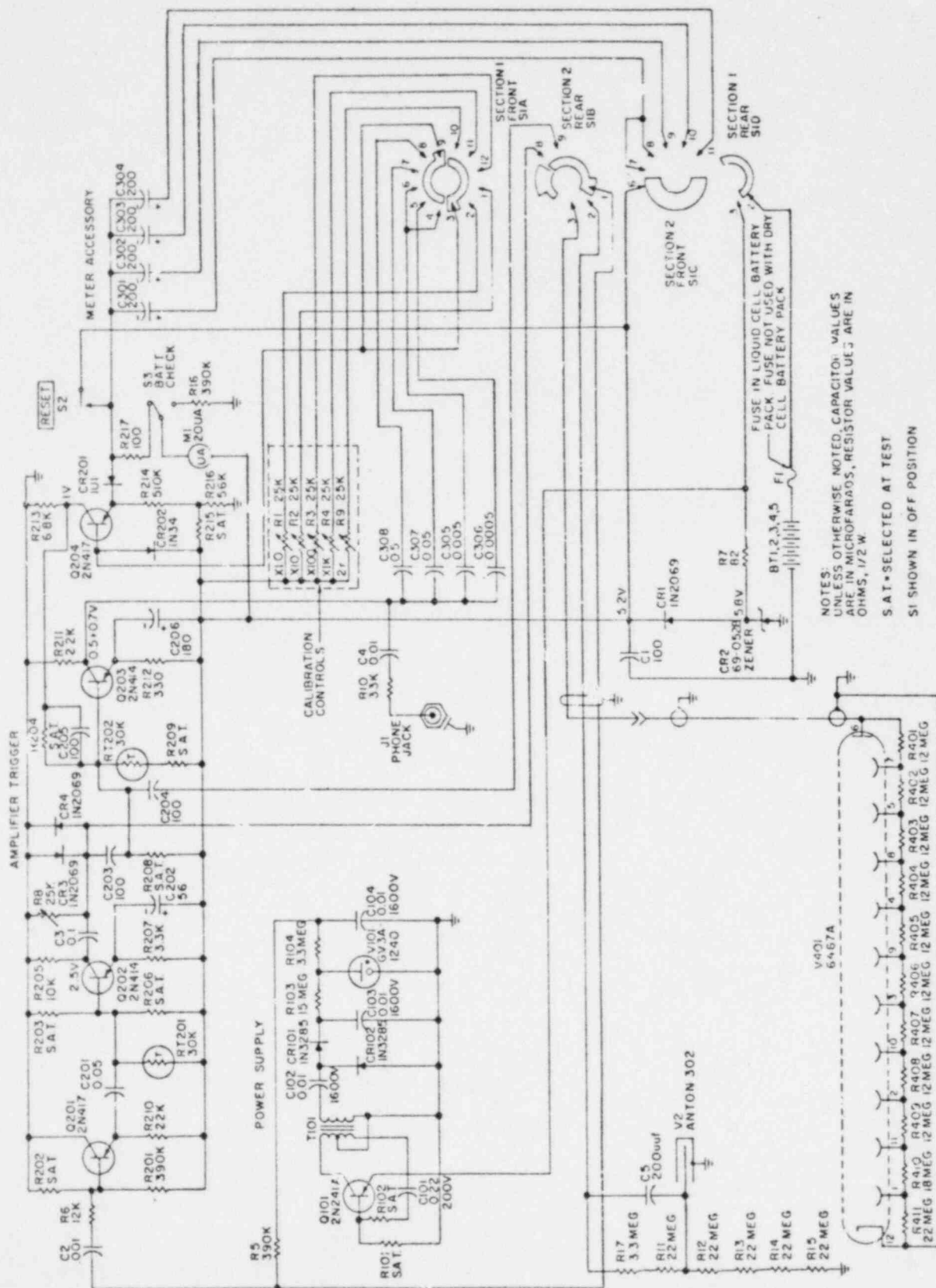
#### 7.0 Gamma Calibration

- 7.1 Set the range switch to the 2 R range.
- 7.2 Place the instrument in a 1.5 R/hr calibrated gamma field ( $^{137}\text{Cs}$ ), (with the alpha probe off to one side), and adjust the 2 R potentiometer as necessary.
- 7.3 In the event the reading in step 7.2 cannot be obtained, repair as necessary and return to step 7.1 and repeat.
- 7.4 Change the gamma field to 0.5 R/hr and check the instrument response. If the instrument response is not within  $\pm 10\%$  of the standard, place a label on the side of the instrument to show the true response.

#### 8.0 Record

- 8.1 Fill in the Regular Instrument Laboratory Record Card (Catalog No. 939979) with calibration data generated by these procedures.
- 8.2 Fill out the ROT calibration card and forward to the Q.A. manager.
- 8.3 Attach the completed calibration sticker to the Eberline PAC-1SAG Alpha Survey Meter.

SECTION V  
DIAGRAMS



NOTES:  
UNLESS OTHERWISE NOTED, CAPACITOR VALUES  
ARE IN MICROFARADS, RESISTOR VALUES ARE IN  
OHMS, 1/2 W.  
S.A.T. - SELECTED AT TEST  
S1 SHOWN IN OFF POSITION

Figure 5-1. General Schematic, PAC-1SAG