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32-150 Digital AES Analyzer Control Calibration Procedure

Overview:
This calibration procedure will ensure that the 32-150 digital AES analyzer control is properly calibrated, and also that the Auger peak energies are correct. This procedure may be used as part of an ISO 9002 procedure certifying proper AES energy calibration.

Safety Warning: **This unit produces high voltages of up to 2133 Volts DC under normal circumstances, and possibly higher voltages if defective. Refer service and adjustment to qualified personnel. Use extreme caution when making these adjustments.**

Tools required:

Two DVM meters and clip leads, battery powered (one will work if that is all you have available).
40kV high voltage probe (7kV probe will work).
Pot tweaker or small straight insulated screwdriver.

Procedure:

1. Turn off the 32-150 and slide the unit out of the rack enough to remove the cover screws. Remove the cover and position the unit so that the potentiometers in the center of the unit can be accessed.
2. Make sure that S1/F3 is in the 1.5 position if you have a 595 or 600 system, or 1.7 if you have a 590 system or 15-110 analyzer.
3. Remove AR3/F3.
4. Connect the high voltage probe to the output (right side of C31/L4)
5. Turn on the 32-150 power and verify that adjusting R16/C2 varies the output voltage by approximately 0 to 80 volts DC. Set it to zero volts DC on the output.
6. In AugerScan, set up an alignment with a lower limit of 3000 and an upper limit of 3000. Set the time per step to 500ms and start the acquisition.
7. Adjust R3/C1 for -2000 volts DC for the 595 and 600 systems, or for -1765 volts DC for the 590 systems and 15-110 analyzers.
8. Turn off the 32-150 and replace AR3/F3.

9. Turn on the 32-150 and adjust R16/C2 for 60 volts DC between TP5/G4 and TP6/K4. This is the fine supply adjustment.
10. Set up an alignment with a lower limit of 1500 and an upper limit of 1500, with a time per step of 500ms. Start the acquisition.
11. Adjust R3/C1 for 60 volts between TP5/G4 and TP6/K4.
12. Center R58/G3 (AES fine gain) and adjust R61/H3 (AES coarse gain) for -1000 volts DC for 595 and 600 systems, or for -882 volts DC for 590 systems and 15-110 analyzers.
13. Stop the alignment.
14. Set up an alignment with a lower limit of 3000 and an upper limit of 3000, time-per-step of 500ms. Start the acquisition.
15. Adjust R61/H3 (AES coarse gain) for -2000 volts DC for 595 and 600 systems, and for -1765 volts DC for 590 systems and 15-110 analyzers.
16. Adjust R3/C1 for 60 volts DC between TP5/G4 and TP6/K4.

Calibration is complete.
Turn off the 32-150 and remove all test leads.

System AES Energy Calibration

Overview:

The 32-150 Digital AES Analyzer Control procedure ensures that the 32-150 is working properly and is within normal calibration performance. The following procedure will fine-tune the 32-150 to your specific analyzer and ensure that the Auger energy peaks are in the correct positions and that the sample is at the optimal focal distance with respect to the analyzer.

Procedure:

1. Load a sample of pure copper.
2. If you are using AugerMap software, set the magnification to 10,000X and use the Area Scan mode to minimize sample topography effect on the Auger signal.
3. Perform an elastic peak alignment and adjust the Z axis sample position to obtain maximum counts and best peak shape.
4. Sputter the sample clean until no carbon or oxygen is present.
5. Re-acquire the elastic peak to ensure that the sample is at the optimum position: highest counts and best peak shape. When the elastic peak is differentiated, the positive and negative excursions should be equal and symmetrical.
6. **From this point on, do not move the sample**!
7. With the beam voltage at 3kV, acquire a survey from 30eV to 1030eV, using .5eV/step, 50 ms/point.
8. Differentiate the survey and check the peak positions against the correct values as listed in the PHI handbook or other reference. A typical value is 920eV for the high energy peak and 60eV for the low energy peak on copper.
9. ***Note*:** If using AugerScan software, you can simply adjust the scale factor in the AES Hardware Properties dialog box rather than adjusting the 32-150.
   If necessary, adjust R58/G3 (AES fine gain) and adjust R61/H3 (AES coarse gain) for proper peak position on the high energy peak. You can acquire an alignment with a range of 900 to 940, .5eV/step, 15ms/point and do the adjustment in real time. For copper, set the n/e peak to approximately 917eV. When differentiated, the high energy Cu peak should be 920eV.

10. Acquire another survey and check that the differentiated peak positions are correct. Document the results for future reference and file it in the system calibratioefrn log.
11. Acquire another elastic peak, **but do not move the sample**!
12. If the elastic peak is not centered at 3kV, then adjust R108 in the Bertan 20-610 High Voltage power supply to center the elastic peak. (For other systems, adjust the 2kV calibration pot in the 20-085 high voltage supply, or P9 on the 664 board in the 18-080 electron gun control).

Calibration is complete.

From this point on, every-time you set the elastic peak, the sample will be at the focal point of the analyzer (maximum signal and best shaped peak), and all of the Auger peaks will be in the correct positions.