

Purpose:

After performing a TG-51 measurement on a Varian linac, many physicists adjust the dose rate by an iterative process of turning the MU1 potentiometer followed by an ion chamber measurement. However, this can take several minutes. When the measured output is close enough ($\pm 0.5\%$) to 1cGy/MU, the process is accepted. However, few physicists realize that this process can be performed real-time and the adjustment performed within 1 minute with an accuracy of $\pm 0.2\%$. This abstract describes how to adjust MU1, MU2, ION1 and ION2 all within 5 minutes. In addition, suggestions are made on how to perform TG-51 on electrons or photons in 3 steps.

Materials

Varian LINAC; Water filled acrylic tank; calibrated waterproof ion chamber; Vertical 1-D motorized ion chamber holder with remote controller accurate to 0.1mm

Methods

- 1) Determine current dose rate of your LINAC
- 2) In service mode, press Calibrate, Calibrate, Integrate (CCI) and record the value under D/R on the screen.
- 3) Multiply your output with the value found in step 2. Record this product.
- 4) Adjust MU1 until the D/R number equals the product you just calculated
- 5) Note which direction you moved the potentiometer MU1, and by how much
- 6) Move potentiometer MU2 by exactly the same amount and in the same direction
- 7) Make a measurement to verify your new output is 1cGy/MU
- 8) Press CCI and adjust potentiometer ION1 in real time to read 2000 (newer LINACs) or 1050 on older LINACs
- 9) Adjust ION2 the same amount and direction as in step 7. Press CCI again, and when it finishes, make sure the display of MU1 and MU2 read within 1, otherwise tweak potentiometer ION2

Results and Conclusions

The time required to perform TG-51 and calibrate the LINAC within 0.2% is less than 30 minutes per energy.